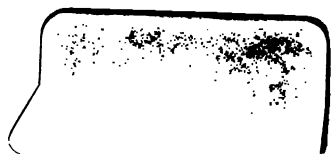
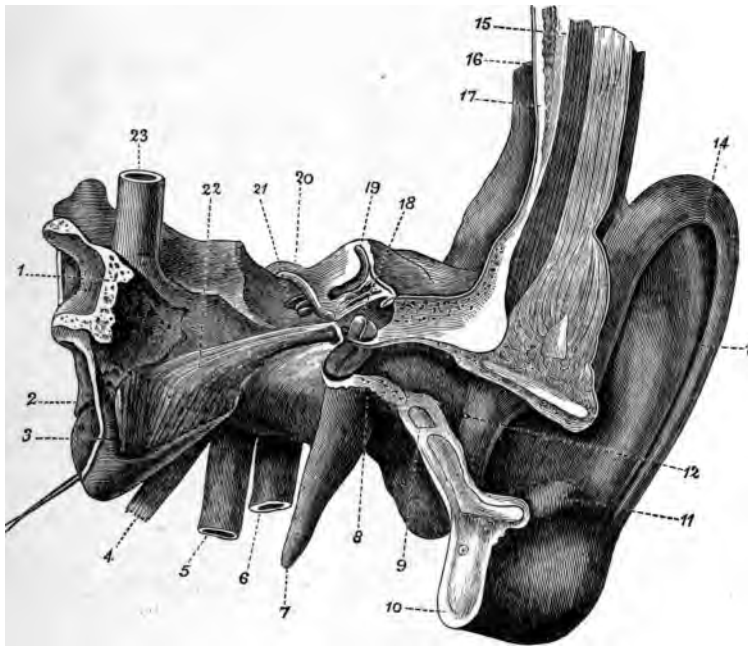


AURAL SURGERY

TOPOGRAPHICAL REPRESENTATION OF THE ENTIRE AUDITORY APPARATUS (LEFT EAR).

This Plate is after Tröltsch, *vide* Tröltsch on "Surgical Diseases of the Ear." translated by Hinton.—*New Sydenham Society*, 1874.



1. *Section of the body of the sphenoid bone.* 2. *Recessus pharyngis* or *Rosenmüller's fossa*, between which and a sound introduced into the commencement of the cartilaginous Eustachian tube projects the posterior cartilaginous lip of the pharyngeal mouth of the tube. 3. *Tensor palati* or *sphenosalpingo-staphylinus* (abductor or dilator of the Eustachian tube). 4. *Levator palati* or *petrosalpingo-staphylinus*. Between the two divided muscles a portion of the membranous part of the cartilaginous Eustachian tube. 5 and 23. *Internal carotid artery*, before and after its passage through the petrous bone. 6. *Internal jugular vein.* 7. *Styloid process.* 8. *Section of osseous meatus.* At the end of the latter the external surface of the membrana tympani is seen. 9. *Section of cartilaginous meatus.* 10. Lobule of the ear. 11. *Antitragus.* 12. *External orifice of ear*, commencement of meatus, the anterior wall of which, with the tragus, has been taken away. 13. *Antihelix* or *opposite rim*, passing below or into *antitragus*. 14. *Helix* or *rim of the ear.* 15. *Temporal muscle.* 16. *Dura mater*, lining the temporal bone internally. 17. *Squamous portion* of temporal bone. 18. *Head of the malleus;* near and behind it the body of the incus; above it the osseous roof of the tympanum, with its hollow spaces, and covered by dura mater. 19. *Inferior semicircular canal*, partly laid open, with one entrance to the vestibule. 20. *Facial nerve*, from the internal meatus, as far as its knee-shaped curve. 21. *Cochlea*, partly laid open. 22. *Tensor tympani muscle* (*Trommelfellspanner*), passing along and above the laid open osseous Eustachian tube, giving off superiorly its tendon, which passes transversely across the tympanum.

A

PRACTICAL TREATISE

ON

AURAL SURGERY

BY

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LONDON

J. & A. CHURCHILL, NEW BURLINGTON STREET

1878

TO THE MEMORY OF

THE LATE JAMES HINTON

AS A HUMBLE TRIBUTE TO

HIS GENIUS, TALENTS, AND WORTH,

THIS TREATISE IS DEDICATED,

BY ONE WHO, FOR SEVERAL YEARS, RECEIVED MANY KINDNESSES AT HIS HANDS.

PREFACE.

THE following pages are intended chiefly for the busy practitioner and student. They contain the substance of a course of lectures I delivered a few years since to the students attending the Cork Ophthalmic and Aural Hospital. When I first wrote the papers, "Practical Remarks on Aural Affections," in the *Medical Press and Circular*, I had no intention of republishing them in book form. I hoped to do some good by writing a few short and practical papers on a branch of surgery which is too often neglected by the student, and a knowledge of which is an essential advantage to the practitioner. As a general surgeon myself, I can all the more appreciate the gain which is reaped from an acquaintance with aural diseases and their treatment. Several friends having urged me to publish these papers in book form, I have ventured to do so, in the hope that it may prove a concise practical work for the practitioner, and give sufficient information to the student, who cannot often hope to peruse the more exhaustive treatises on this subject.

Avoiding as far as possible reference to matters

which are not of practical importance, I have reproduced the "Remarks" nearly in the order in which they appeared in the *Medical Press*. The works of Turnbull, Roosa, and the exhaustive treatise recently published by Dr Burnett of Philadelphia (Messrs Churchill), can be used as books of reference by those who desire more complete information on some matters than can be found in these pages. I desire to express my thanks to Dr Turnbull, senior, of Philadelphia, for the many useful hints and suggestions on various practical points which he from time to time has sent me. Miss Boole, who was for some time engaged assisting me at the hospital, I have to thank for several of the drawings which she has made of the aural instruments. Dr Ringrose Atkins, now medical superintendent of the Waterford Asylum, has written at my request the chapter on Othæmatoma. Dr Atkins has furnished me with some beautifully executed drawings of this affection which appear in the *Atlas*, now in the hands of Messrs Churchill, and shortly to be published by them. I may just say, in conclusion, that the treatment recommended has been fully tested during the past nine years in some thousands of aural cases which have passed under my personal observation. Where this has not been so, I have not hesitated, in stating the experience of others, to express my inability to speak positively of results. If without

putting forward any claim to originality, I have succeeded in giving to the profession, more especially in Ireland, a concise epitome of modern aural diagnosis and therapeutics, my object will be fulfilled. Therefore, with all diffidence, and no small anxiety for its welfare, I launch my frail bark, hoping that into whatsoever harbour it finds entrance, it will be received with that degree of consideration which I conceive its aim and design entitle it to get.

H. MACNAUGHTON JONES.

4 CAMDEN PLACE, CORK,
March 1878.

CHAPTER XIII.

CHAPTER XIV.

CHAPTER XV.

AUTHORITIES REFERRED TO.

AURAL SURGERY.

CHAPTER I.

INTRODUCTORY REMARKS.

MANY years have gone by since Sir William Wilde drew attention to the general vagueness which exists amongst medical men on the subject of Aural disease. Yet to the present day how few medical men do we find who do not view interference with any aural complication, save the simple blocking-up of the meatus with cerumen, as "meddlesome" and dangerous? How constantly do we hear physicians, well informed on other matters, speak of any interference with the ear as "poking" and "meddling!" The cause of this is not far to seek. To the same source of ignorance is attributable the want of knowledge of ophthalmic and laryngeal affections. The teaching of all the three organs—eye, ear, and throat—is too much neglected in the schools generally: an accurate knowledge of their diseases and pathology is not sufficiently insisted on. Students are satisfied with the most superficial idea of these special branches. Certainly, in this respect, the term "speciality" is an unfortunate one. Most students view what they are pleased to regard, and are taught to look on, as special studies,

as outside the pale of general surgery. They calculate that at most a question or two in an examination is all that they have to fear. They know that most examiners in general surgery are themselves devoid of an accurate special knowledge of these branches. Hence comes neglect in the study of them, and the deplorable result that yearly the great majority of men are obtaining qualifications to practise who are totally ignorant of the advances which have been made in recent years in the diagnosis and treatment of the diseases of three of the most important organs in the body. The remedy is simple and obvious. Students should be practically taught the stress which the examining bodies lay on a sufficient study of these parts. They can only be brought to feel this by a practical examination in all three branches before they obtain their licence. This would speedily cause a greater interest in, and result in a more diffused knowledge of these subjects. We should not then, as is now frequently the case, have men starting in practice who have never seen an ophthmoscope, never looked through an aural speculum, and have never applied a laryngoscopic mirror. To return to the particular organ under discussion, it is my object in these remarks to furnish the student and general practitioner with some brief, but practical, hints on the diagnosis and treatment of aural affections. The many valuable treatises now published on the ear are, of course, replete with information on this branch of surgery; but from several years' experience, and from constant consultation with medical men, I find that such are not carefully or widely read, and hardly at all by students. Hence, through the medium of these pages some concise rules

for practice, and useful hints on treatment, may be acceptable both to the practitioner and student. In order to do this I shall endeavour to make these observations as simple as possible, and deal principally with those diseases of every-day occurrence, for the treatment of which all practitioners are being constantly consulted. It will not be necessary for this purpose to enter into vexed questions as yet unsettled, but simply to point out the leading principles which should guide the surgeon in arriving at a quick and safe diagnosis in any aural case. Nor is it necessary to distract attention by repeated reference to authorities. The mode of examination which I follow and detail, is that usually pursued by aural surgeons; but more especially is that line of practice recommended which was adopted by unquestionably the leading English aurist since Toynbee's death, the late James Hinton. His zeal in the cause of aural surgery, and his anxiety for the spread of knowledge in this department, have attracted many to labour in this field. It was through the same disinterested kindness on the part of Mr Hinton that I was, many years since, first brought to take an interest in aural surgery, and to feel, in his own words, "that very few fields of practice afford subjects of greater interest to study, or give a larger reward to the exercise of skill."

Those who desire a more extended knowledge of the subject, I would refer to the works and papers of Hinton, especially his "Questions of Aural Surgery," published in 1874, and those of Toynbee, Von Tröltsch, Dalby, St John Roosa, Turnbull, and others. It is not here necessary to spend time on the anatomy of the organ. Those who are deficient in knowledge on this point had better

make good their deficiency before they attempt the treatment of affections of the middle and internal ear. This, however, they can readily do from any standard work on anatomy, in which study they will be materially assisted by models, and the prepared sections of the petrous portion of the temporal bone:—1. The section showing the meatus, membrana tympani, ossicles, and middle ear; 2. The section showing the cavity of the tympanum, and its openings; the internal ear with its semicircular canals, the cochlea, and the various orifices. (These temporal bones may be obtained from Messrs Matthews, of London, and will be found extremely useful aids in the study of the anatomy of the ear.) It must be necessary in many cases to combine the treatment of the nasal passages and throat with that for affections of the ear. This frequently happens, and therefore it is necessary for the aural surgeon to have some special apparatus for the exploration of the nose, the posterior nasal orifices, and the throat. In fact, when we reflect on the large percentage of cases of deafness caused by unhealthy states of the throat, it is apparent that one of the main points in the successful management of such is to look carefully to, and correct, any morbid state of the latter. It may be well here to mention, in order, the apparatus which it is essential should be possessed by all who wish successfully to diagnose and treat affections of the ear.

Bull's eye argand burner, and universal bracket (same as that used for laryngoscope).

Laryngoscope reflector, with spectacle frame, or on handle.

Double otoscope.

Aural specula (three sizes), or Brunton's auriscope.

Tuning-forks (different keys).
Pneumatic speculum.
Eustachian catheters (three sizes).
Two of Noyes' catheters (right and left).
Bougies.
Politzer's bags.
Ear syringes.
Small syringe for Eustachian catheter.
Ear forceps.
„ Toynbee's lever ring.
„ Toynbee's retangular.
„ Hinton's retangular.
Knife for incising membrane (myringotome).
Aural probe.
Turnbull's Eustachian forceps.
Wild's snare for polypus.
Rheophore. (Galvanisation of membrane).
Artificial membranes.
Absorbent cotton wool.
Tongue depressor.
Nasal specula.
Nasal douches (syphon and bag).
Laryngeal mirrors.
Mirror for rhinoscopy.
Laryngeal brushes.
Tonsil guillotine.

Though this to some may appear a formidable list, it must be remembered that it includes nearly every instrument requisite for the treatment of any aural affection, certainly most that would be required in ordinary practice.

With a speculum, tuning fork, otoscope, Eustachian

catheter, and Politzer's bag, the great majority of aural lesions may be diagnosed with comparative certainty. The remaining instruments are not so much diagnostic as therapeutical, and for the purpose of treatment. We shall consider the method of employment of, and the most improved form of each of these instruments as we are dealing with the various states necessitating their use. We now pass to the best plan of examination, and the steps in consecutive order, which it is necessary to take in proceeding to form a diagnosis. The following brief method of examination is that which I usually adopt:—

History of Case, including—

1. Causes.
2. Hereditary influences.
3. Past treatment.

Present Symptoms, including—

1. Pain.
2. Discharge.
3. Evidence of constitutional taint.
4. Hearing distance.
5. External meatus (condition of).
6. Membrana tympani (condition of).
7. Tuning-fork.
8. Eustachian tube (state of).
9. Throat (state of).

This can be done in tabular form thus:—

No. of Case—Name—Age.
History, &c.
Symptoms.

	Right ear.	Left.
HD	,,	,,
EM	,,	,,
MT	,,	,,
TF	,,	,,
ET	,,	,,

Throat.

CHAPTER II.

METHOD OF EXAMINATION.

WE will now take a given case of deafness, and investigate the mode of ascertaining the condition of the various parts of the organ of hearing above tabulated.

History of the Case.—Having ascertained the general state of health of the patient, the first step is to inquire into the length of time the deafness has lasted, if both ears are affected, and if so, the manner in which both were attacked; next to note carefully the nature of the progress of the deafness, if this has been rapid or insidious, with or without pain or discharge. The careful examination and comparison of the hearing power of the two ears is requisite in every instance. Patients constantly affirm that the hearing of one ear is perfect, yet on coming to test it accurately we may find it seriously impaired, the reason of this being that while the conversational power is not interfered with, the hearing distance as measured by the watch, is considerably so. We should now seek closely for some cause, making inquiries into the habits, occupation, state of health at the time of, or preceding the invasion of the symptoms. The connection of deafness with the exanthemata is a point which should not here be overlooked, these and the various fevers being frequent causes of deafness. Gout also and syphilis should not be forgotten, the former particularly, both as

a direct and hereditary source of mischief. The occurrence of tinnitus is a constant symptom. We should inquire then carefully into the history of the noises heard; how and when they commenced, their nature, if they have increased of late, if they are periodical or liable to exacerbations. Tinnitus may be caused by almost any abnormal state of the meatus, membrane, middle ear, labyrinth, or Eustachian tube, and therefore it is only valuable as a diagnostic sign when taken in conjunction with other symptoms and appearances. The most frequent causes in the external meatus met with in general practice are cerumen, foreign bodies, abscess, exostosis, polypus. It is surprising the minute portion of cerumen which, if it infringes on the membrane, will produce this unpleasant complication. This week I was consulted by a gentleman for noises in the ear; the hearing power was normal, and on examination I found the drum healthy and the only discernible cause a small collection of cerumen which was close to the membrane, and which perhaps had been pushed further in by that most reprehensible of all practices, namely, attempts to clear out the ear with pieces of rolled paper, or the end of a towel, &c. On gently syringing out the ear I removed with the small atom of cerumen a hay seed, which had escaped my notice, lying, as it did, flat against the wall of the meatus. It is difficult to isolate those states of the membrane itself, which cause tinnitus, for in my experience nearly all its abnormal appearances and positions, as increased concavity, dulness, thickening, want of mobility, are secondary results due to faults pre-existing in either the cavity of the tympanum or in the Eustachian tube. The fact that there is a large number of

cases in which relief is given when air is forced into the cavity of the tympanum by Politzer's bag, and the membrane temporarily restored, or when the tension is lessened by the suction through a tube placed in the external meatus, or by the pneumatic speculum, proves the practical importance of noting the position and appearance of the membrane in all such cases. We shall have occasion subsequently to consider the effect of spasm of the tensor tympani or chronic contraction of this muscle in producing permanent alteration in the appearance of the membrane, and frequently incurable tinnitus.

Perhaps of all the causes of tinnitus there is no one so frequent as that of mucus in the cavity of the tympanum. The diagnosis of this condition we will consider presently. It is frequently accompanied by closure or obstruction of the Eustachian tube. The occurrence of tinnitus during ordinary catarrh in the head when the nasal mucous membrane and that lining the faucial orifice of the tube is congested, proves how slight a cause will give rise to this symptom if there is any obstruction to the passage of air or fluid through the natural outlet. Excluding causes existing in the external meatus, the membrane and cavity of the tympanum, and the Eustachian tube, we have to deal with a large class of cases in which the cause is in the labyrinth, the semicircular canals, or cochlea. Many of these cases have a distinct train of symptoms described so accurately by Menière under the head of "labyrinthine vertigo." The most usual attendants are giddiness, tendency to fall, staggering gait, occasional vomiting, and various degrees of tinnitus. Such symptoms may undoubtedly be produced by other disordered states, than those taking their origin in the

labyrinth, and may be secondary from the results of disease in the tympanum, or any cause producing labyrinthine pressure. For example, in those cases in which relief is afforded, and the noise disappears on suction with a tube in the meatus, the cause is, as pointed out by Mr Hinton, muscular, and the stapedius and tensor tympani are in a state of chronic contraction. There is at present a man, aged forty-eight, attending the hospital, who came on the 20th of October, with the following symptoms:—He for some time past had, as he described it, "a reeling in his head." His gait was staggering, he had to place his hand against the wall to support himself. He was, he said, "more like a drunken man," and on his way to the hospital, to which he was assisted by his wife, he thought that he should have been taken for one. He had musical sounds in the left ear. He did not hear the watch on contact in this ear. He had great pain, and had not slept for ten nights previous to his visit. He looked worn and pallid. His tongue was coated with a creamy fur, and he had a difficulty in retaining any food on his stomach. On examining the meatus, I found the orifice occluded with discharge, on washing which out I discovered a large fibroid mass filling up the meatus, quite unlike an ordinary polypus. On closer examination, I found that this sprung from the tympanum. The hearing of the other ear was normal, and the appearance of the membrane healthy. There was no noises in it. I snared the growth as well as I could, and brought away the greater part of the mass. I gave him twenty grain doses of bromide of potassium, vesicated him freely over the mastoid process, and regulated his diet. The meatus was considerably swollen and narrowed. From this until the

27th I kept the meatus clear, cleaning it out daily, and removing the small remaining portion of the polypoid growth with the lever ring or rectangular forceps, and making him continue the bromide of potassium. On this date I have a note that the "reeling is much better, sleeps well at night." On walking, he still had to place the hands to the wall, and his wife led him to hospital. I now touched the remaining granulations with chloro-acetic acid and chromic acid alternately. On the 3d November the pain was much less, the meatus was still considerably contracted; it was cleaned out every second day; the noises were much less, and his gait was improved; there was great pallor and debility. I now gave him thirty drop doses of the muriated tincture of iron. On the 17th of November I reverted to the bromide of potassium. The treatment has been much the same since that date. A twenty-grain solution of nitrate of silver has been occasionally used to the membrane and meatus. This latter is now employed, and all the mass has been removed or destroyed. He has returned to his work. His gait is perfect, he comes to the hospital regularly, there is no pain, the discharge has nearly ceased; there is still no hearing in the ear, but the tinnitus has gone; there is a large perforation of the membrane, all pulsation in which has ceased for the past week. In this case there can be little doubt that all these formidable symptoms were caused by pressure, conveyed to the labyrinth by the fibroid mass, which destroyed the membrane, and encroached on the tympanic cavity.

There are, however, constantly occurring, cases in which the tinnitus depends on no assigned cause, if we except the ambiguous class of "nervine." Deafness in such is not a necessary attendant. The only symptom com-

plained of is the constant noise. These cases I find are as a rule incurable, and resist any form of treatment. On examination the membrane is healthy, there is no abnormal sound heard with otoscope, the throat and faucial orifice of the Eustachian tube are healthy, the deafness may be slight and conversational power not in the least affected, yet the tinnitus is intolerable. Some of these date the origin of their trouble to nervous shock, some to the occurrence of fever, the administration of medicine, climatic influences, as residence in India. The sole clue to the mischief usually obtainable is by means of the tuning-fork, which only yields negative results. No good that I am aware of can be effected by any local treatment when such a state supervenes. That quinine produces analogous symptoms in some persons to labyrinthine vertigo is well known. Though I have in the Cork Fever Hospital, and in private practice constantly administered quinine in remittent fever, and as an antipyretic in ten to fifteen grain doses, as often as every third hour, producing at times headache, tinnitus, and vomiting, I have never known any permanent effects from its administration. Many years since, while making some experiments in which I was assisted by the late Professor Blyth, I gave a healthy man, a pensioner, thirty grains of quinia (the alkaloid) for the purpose of estimating the total amount of quinia excreted by the kidneys for twenty-four hours subsequently. This man suffered for a considerable time from tinnitus and partial deafness, this continuing for nearly twelve months, gradually becoming less. He died eventually several years later from the effects of alcohol. The tinnitus and deafness never completely deserted him. I am aware of a case in which the reeling and staggering gait produced by

quinine, simulating those symptoms present in labyrinthine vertigo, has been mistaken for drunkenness, with most unpleasant consequences to the sufferer. In inquiring into the origin of tinnitus we must not forget such causes as exposure to cold, bathing, nervous shock, general debility, hysterical temperament, mental excitement and worry, overstrain at business, general depression of spirits, exposure in open boats, the effects of gunnery experiments, and blows on the ear. I have had a patient in whom troublesome tinnitus has been produced by snuff which had entered the Eustachian tube and the cavity of the tympanum, the tinnitus being removed on washing out the cavity of the tympanum and clearing the tube. Women during the menopause in consequence of hæmorrhages, young girls with irregularities of menstruation, and attendant general hyperæmic or anæmic states, especially those who are the victims of severe neuralgia, are frequently attacked by troublesome tinnitus. In children deafness with tinnitus may be caused by the exanthemata, whooping-cough, mumps, and worms. Morbid states of the general system dependent on diseases of the heart, kidneys, and liver, are frequently accompanied by tinnitus. The changed and rigid arterial coats which are the result of renal disease may, when their calibre is narrowed, as pointed out by Dr Jago, produce tinnitus. So also tumours in the cervical region, alterations of the blood-current in the carotid or basilar arteries, an aneurismal condition of these vessels, or disease in their coats, may be the source of this symptom. The over-indulgence in alcohol or tobacco may give rise to it. The importance of the abuse of tobacco in causing deafness is, I believe, frequently overlooked. I have had many cases of deafness without apparent

pathological changes in confirmed smokers, in which, when the habit was relinquished, considerable and permanent improvement has taken place. Turnbull, in his treatise on "Tinnitus Aurium," makes reference to the association which exists between the advent of the noises and insanity.*

It would appear that, as Tröltsch has said, there is a "nervous tinnitus aurium" and a "material or acoustic which may exist at the same time"—a double set of hallucinations, one distinctly aural, the other cerebral. Schwartze's opinion, quoted by Turnbull, however, is most important—"subjective aural sensations, which are caused by demonstrable affections of the ear, may, in predisposed persons, especially when there is hereditary tendency to mental disease, become the direct cause of aural hallucination, that may accelerate the outbreak of mental disease." Any one who has seen the distress caused to some by the unceasing roar in the head, and heard their declaration that "the noises would drive them insane if not relieved," must recognise the importance in all those cases where aural tinnitus accompanies mental hallucination, of making a careful examination of the ear. Certainly there can be no

* I have had quite recently a striking example of the supervention of cerebral trouble on aural disease. A young man with perforation of both membranes came to the hospital. He had a profuse discharge, complained of loud noises—there were constitutional symptoms—coated tongue, rapid pulse, and high temperature; his gait was "staggering," and he could not walk unassisted. He was taken into hospital, and in a few days became violently maniacal, requiring restraint. His friends then removed him to his own home. Here he got paralysis of the left upper extremity, the brain symptoms abating somewhat, but a semi-idiotic state remaining. He is at present under treatment. An abscess is forming in the left knee, and a superficial collection of pus rapidly appeared on the dorsum of the right foot.

doubt that such aural complication may accelerate and increase the mental affection. As regards the character of tinnitus, I do not find that this, as a rule, makes much practical difference. Habits and occupation may have something to say to this. I have usually found that the milder and more removable symptoms are described as a "buzzing" or "singing," such as when cerumen is present, or a foreign body in the meatus. A "drumming" in the ear I have noticed frequently, with temporary closure of the Eustachian tube. In a gentleman with old tympanic mischief and evidence of nervine impairment, the chief thing complained of was the occasional fancy that he heard persons addressing him, causing him to turn round to discover who was speaking to him. This hallucination of voices in the ears is, in my experience, not common. I have myself, when overworked and dyspeptic, suffered for days from an unpleasant knocking in the ear coming on at intervals, a state which I am in the habit of relieving occasionally by a powerful inflation of the membrane. Mr Hinton drew attention to the value in a diagnostic point of view of the musical nature of the sound in cases of nervine deafness. This accords with my own experience. But I have more frequently found a loud roaring or rushing noise complained of in those cases where the deafness was slight, and in which the tinnitus yielded to no treatment, and where no abnormal state, recognisable, save with the tuning-fork, existed to account for it. I have come to look on these musical sounds, and those likened to the roaring or rushing of water, as the most unfavourable in a prognostic point of view. I shall refer to the treatment of tinnitus in dealing with the diseased conditions which give rise to it.

CHAPTER III.

HISTORY OF THE CASE.

Hereditary Influences.—The history of deafness in the family should especially be inquired into in those cases where the difficulty of hearing comes on without any assignable cause, and where there is no marked abnormal condition to account for the malady. That deafness "runs in" certain families is well known, and this hereditary tendency (apart from such affections as gout and syphilis) will throw light on many cases in which the cause is obscure. I have just at present a lady under my care who is very deaf, and whose mind is beginning to fail. She is one of a family, two other members of which are deaf. Deafness has been transmitted for generations; and, coincident with the deafness, there is also a family history of insanity. Gout is perhaps the most mischievous heirloom. It may produce its effects at any age, and these are often most insidious, but those cases that I have seen were all over the age of thirty. I have noticed the coincidence of exostoses of the external meatus frequently in gouty patients, and in those in whose family there has been a history of gout. Hinton drew attention to a peculiar "irritability of the meatus attended by slight serous or sticky discharge, with itching or pricking pain, the walls being somewhat swollen and having a tendency to

purple in their redness," as a form of gouty affection. This I have many times seen.

In January 1871, a gentleman consulted me for deafness in the right ear, the left being hopelessly deaf for many years. He could not hear the tuning-fork louder in either ear on closure. The watch was heard at one inch with the right ear, the nail at two-and-a-half feet. He never had discharge or pain, and never had any noises. The external meatus was narrowed and contracted from small exostoses, and the membrane was thickened and vascular. There was occasional sense of fulness and throbbing. The sound with the otoscope was abnormally moist. He had consulted Mr Hinton in 1869, and I had several communications with him about this case, in which he took a great interest. Both ears were much in the same condition,—the appearance before referred to, viz., a moisture and packing up with epithelium. Mr Hinton regarded the case as of a gouty nature. The patient was always relieved by iodide of potassium and gouty remedies, the employment of the douche, and of injections of iodide of potassium into the middle ear, and careful attention to the external meatus. The last time I saw him he was considerably and permanently benefited.

In 1870, a gentleman (age 60) consulted me for deafness arising from a condition much the same as that described in the last case. The exostoses were perhaps larger. He had become gradually deaf, and was worse in one ear than the other. He never had suffered from gout himself; his grandfather and father both died from the effects of gout. Other members of his family are greatly afflicted by the same malady.

He was convinced that his condition proceeded from the same cause, and doubtless he was correct. Nothing improved him.

In 1873, a gentleman (age 40) consulted me for extreme deafness in both ears. There was a gouty history, and he was of a gouty family. He always lived well, and indulged pretty freely in alcohol. The meatus of one ear was almost completely occluded with an exostosis, and there was a similar condition, though less in degree, of the other. Under treatment directed to reducing the congested condition of the meatus by frequent cleansing with astringent injections, and attention to the cavity of the tympanum, with constitutional remedies, he improved considerably before he passed from my care.

Present Symptoms.—Pain: Pain, more or less violent, is present in all acute inflammatory affections of the ear. For instance, it is, as a rule, very acute in ordinary furunculous abscess of the meatus, in acute perforation of the membrana tympani, and in acute inflammation of the same. Pain, under any of these conditions, may produce a state bordering on delirium, so wild and fierce may it become, especially at night. So also the constant deep throbbing pain, when mischief has extended to the internal ear, is peculiarly intense and most difficult to relieve. This latter pain, in those cases which I have seen, is characteristic as radiating over the side of the head, and is often accompanied by frontal ache and great intolerance of light. In children, especially, is the occurrence of pain of importance, as it is often the only guide to the malady from which the little one suffers; the carrying of the hand to the head and the

affected ear drawing the attention of friends and physician, long before the occurrence of discharge, to the seat of the mischief. But in many cases it is surprising what an abnormal condition of things may exist without the occurrence of pain. Constantly we see persons with evidence of long-standing disease, as exostosis of the meatus, polypus, thickening of the membrana tympani, or even perforation of the same, and thickened states of the membrane of the cavity of the tympanum, or ankylosis of the osicles, all lesions of a chronic character in which no pain has been complained of, and in which patients deny its existence. Some of the most intractable forms of deafness, with nervine complications, are those in which there never has been from first to last any pain. The presence of pain is of value chiefly in showing the acute nature of the attack, and (excluding causes existing in the meatus) it will point to inflammation of the membrane, and if there be no appearance of such, to mischief in the cavity of the tympanum or in the internal ear. The advent of acute pain in an old-standing case of aural disease, where there is not any manifest cause for its occurrence, should always be looked on with suspicion, the more especially if such be accompanied by any general constitutional symptoms, such as rigors, vomiting, alterations in the pulse, constipation, or drowsiness. Pain in the ear under any circumstances should both in old and young receive immediate attention, and its source be carefully ascertained.

Discharge.—The history of a discharge, the length of time it has lasted, and the states which preceded its occurrence, the fact of its being coincident with pain or relieving it, its nature, if mixed with epithelium and

mucus, its quantity, should separately be inquired into. It is well to see if there is any foul smell, and if the discharge be mixed with blood. One clear rule should be always observed—namely, to regard discharge from the ear as but a symptom of some diseased state of the auditory passages, and one which must be dealt with only after ascertaining its exact source. Nothing can be more mischievous than to regard the mere discharge as the disease, and to remain satisfied with undivided attention to it without arriving at a correct conclusion as to the cause of this symptom. Frequently I have seen polypus, perforation of the membrane, destruction of the ossicles in cases treated as "otorrhœa," and these serious complications overlooked from neglect of the simple precaution of examining an ear carefully with a speculum when the discharge has been all removed. As a diagnostic symptom, discharge is valuable by directing our attention from the external meatus to the membrane and the middle ear, the constant sources of its presence.

Syphilis.—In children the fact should not be forgotten that transmitted syphilis is a frequent source of ear mischief. It is difficult to say when the morbid changes which bring about this terrible form of deafness commence. Struma and syphilis have both their share in producing aural complications in young children. But while frequently to the former are attributed the symptoms which are observed in the young child and infant, the presence of the latter is overlooked. In many obscure cases where there is no proof of the parents being strumous, and no appearance of a strumous diathesis in the child, the search must be cautiously but carefully

made for a syphilitic origin. More particularly is this necessary in those acute cases which we occasionally meet when a child or young infant is attacked rapidly with inflammation in the middle ear, followed by profuse otorrhœa, and perhaps convulsions and death. In such a case that I saw lately there was general blood-poisoning and collections of pus formed in different parts of the body; the attack was ushered in with snuffles and an abscess over the antrum. The father had syphilis, and the previous children had all died shortly after birth. Suspicions must be awakened by such a history, and it should not be overlooked, both for the sake of the patient and the surgeon. But those cases are most frequently met with in which the deafness is hereditary, and the child has never heard well, without any history of discharge, and when there has been no complaint of pain. These children are not brought in the earlier years of childhood, and we are not often consulted until the growing deafness has become so inconvenient, at or about the age of puberty, that the parents, particularly amongst the poorer classes, are forced to get advice. The symmetrical nature of these cases, as pointed out by Mr Hutchinson, may assist in the diagnosis. The presence of the characteristic teeth, also described by him, the coincidence of syphilitic lesions of the cornea, the proofs of old skin affections, and the general characteristic appearance with which we become familiarised on seeing a number of such cases, will confirm the diagnosis. We have Hinton's testimony that one-twentieth of the cases of deafness attending Guy's Hospital had as their cause hereditary syphilis. This proportion has certainly not been nearly so great in the cases under my care. This,

of course, would be accounted for by the greater prevalence of inherited syphilis in such a city as London. The three following cases are typical of the hereditary syphilitic class, and therefore I refer to them here.

Mary A., orphan, age 18. Could trace no family history. Has always been deaf; barely hears the watch on contact with left ear; altogether deaf with right. There has never been any pain or discharge. Cornea of both eyes is dull. There is a peculiar nasal voice, and difficulty in pronouncing some words. The external meatus of both ears is healthy; the membrana tympani of both is very concave and dull, with a prominent malleus. Eustachian tubes are free. She hears a tuning-fork well in both ears when placed on the head, the sound becoming duller on closure of the ear; tonsils congested, teeth normal.

A. M. H., female, age 15. Her father, who is dead, was affected with deafness. She has been deaf since childhood, and the deafness has greatly increased of late. The cornea of both eyes is dull, and old interstitial deposits exist. Hearing apparently almost completely destroyed, neither hearing loud noises nor conversation in the loudest tones. External meatus healthy; membranes extremely concave and dull, with marked pockets; Eustachian tubes closed. Has the same peculiar lisp and difficulty of pronunciation as in last case. Teeth partially syphilitic and discoloured.

Miss ——, age 15, consulted me, November 1874, for old interstitial keratitis. She was the first child not still-born of the family; all the previous children were syphilitic. She has also now slight deafness and typical syphilitic teeth. Her eyes were healthy until she was

five years old, when she had an attack of interstitial inflammation of the cornea, and a second attack five years subsequently. She has the peculiar look and curious articulation which I have noticed in some of these patients.*

* Let me refer briefly to the teeth here alluded to, and which have been described by Mr Hutchinson as characteristic of hereditary syphilis, and ask attention to the distinction drawn by him between the teeth of persons affected with hereditary taint, and those who have had mercury administered in infancy, and who have, as a consequence, the teeth of mercurial stomatitis.

	Mercurial Stomatitis.	Hereditary Syphilis.
Teeth primarily affected, =	1st Molars. Premolars escape.	Central upper incisors.
Character of abnormality, =	Enamel deficient, transverse lines on incisors and canines, dirty, discoloured, coated with tartar; pitted.	Peculiar *notch* in incisors, dirty, badly formed; often combination of effects seen in deficient enamel and dentine from mercury and syphilis.

See Hutchison's "Illustrations of Clinical Surgery."

CHAPTER IV.

PRESENT SYMPTOMS—HEARING DISTANCE.

THE method I adopt to note the degrees of hearing is as follows:—

H.D.	W. not heard.	If the watch be not heard when pressed against the ear.
	Contact.	When it is heard only when it touches the ear.
	$\frac{1}{60}$.	Heard at one inch.
	$\frac{2}{60}$.	Heard at two inches, and so on to
	$\frac{60}{60}$.	Normal. H.D.

In testing with the watch it is well, in the case of children, to turn the child's face away before holding the watch to his ear, otherwise, as Mr L. Browne has noticed in a letter on this subject referring to these remarks, the child on seeing the watch may say that it is heard, when it is not.

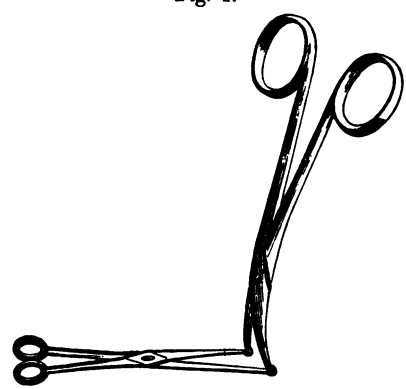
If the watch is found to fail, the nail furnishes a good test in bad cases, the distance at which the click of the nail is heard being noted. Or the tuning-fork may be tried with the normal ear and the affected one, and the length of time the perception of the sound is retained marked. So also the patient may be tried by engaging him in conversation at different distances, and with his face turned away from the examiner. The fact of his

hearing better in a railway carriage, or worse at a dinner table, when many persons are speaking, and not being able to join in a conversation, should be recorded. This latter peculiarity points particularly, in my experience, to affections of the middle ear and ankylosis of the bones. In some instances the tuning-fork will be heard only when placed against the teeth. I can only call to mind one case in which the sound was not so conveyed.

Auditory Meatus.—Having thus far ascertained the characteristic symptoms from which our patient suffers, the mode of their occurrence, and the nature of their progress, with such personal or family history as may be of importance, we next proceed to examine the present condition of the auditory passages. I shall here merely detail the steps which it is necessary to take, as it will be requisite to refer to each part specially in considering the various morbid conditions requiring treatment. The external meatus (excluding for the present affections of the auricle) is first to be examined. For this purpose we must have at hand a reflector, a few different sized specula, an ear syringe, and some cotton wool. It is well also to have means for cleansing thoroughly out the canal and removing any small portions of epidermis or cerumen or fungus which may remain after the syringing, and which would interfere with a full view of the meatus and membrane. I have been in the habit of using an iris hook with cotton wool rolled round the point for this purpose. It is also useful for touching the membrane with any solution in cases of ulceration or perforation, or in destroying the remains of polypi. Wilde's forceps, or the retangular forceps used by Hinton (fig. 1) may be required to detach adhesive

epidermis or any small foreign bodies. The rectangular forceps will be found of the two the most useful; it is lighter, and the teeth being so perfectly adapted, the smallest particle may be grasped with it and withdrawn. It does not in the least interfere with the view of the meatus, and may be used through a wide speculum. We have now to place our patient in a good position for examination and to introduce the speculum. Whenever we can take advantage of it there can be no doubt that, as Hinton says, "ordinary daylight gives the most dis-

Fig. 1.



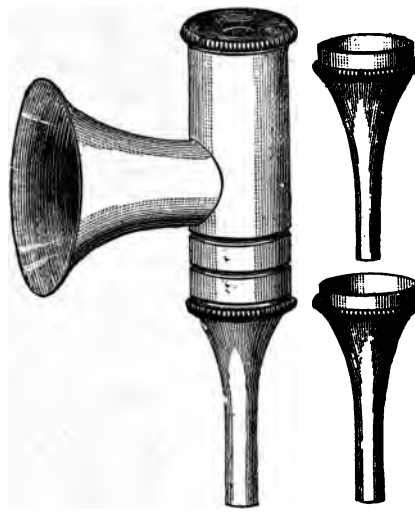
tinct illumination." A beautiful view of the membrane may be obtained by means of sunlight, but the light must be thrown rather on the wall of the meatus than directly on the membrane, as by its intensity it dazzles and prevents us seeing distinctly. It will be found most convenient to examine the patient standing, so as that he can be quickly moved in any direction. I generally get the person opposite to me and slightly between me and the light. A child is best examined

standing on a chair, the head, if the child is restive, being fixed by the mother or some assistant. The mirror with the spectacle frame ordinarily used in laryngoscopy, with the ball-and-socket joint, will be found most useful, as with it we can either examine with the hand, or with the mirror on the face. With a little practice full illumination can be had from the face-mirror, and if there is any manipulation necessary it is the best method of using the mirror, as we have both hands free to carry such manipulation out. If we use artificial light, and employ the bull's-eye burner, with the universal bracket, to be had of any instrument maker, the patient must be placed sitting, and with the light a little to the side of and behind him. Any one can, after a short time, familiarise himself with the steps necessary to make a complete examination by this method. For bedside purposes, and in houses where we are called to see patients at night, the most perfect lamp I know is that of Messrs Weïss (a drawing of which I will furnish when describing the instruments necessary for diagnosis and treatment, see figs 19 and 20). It is in a small portable case, 3½ inches by 3¼, which contains a lamp and paraffine; the lamp, which, with a miniature bull's-eye burner, furnishes a beautiful clear light, can either be placed standing on a table, or held in the hand of an assistant. With it I have frequently made ophthalmoscopic and laryngoscopic examinations. It is, therefore, a most useful companion, in fact, almost an indispensable one, when we are summoned in a case of emergency to the country. We now proceed to introduce the speculum, Here we must remember the great timidity which many patients exhibit on being

examined. Therefore it is that a light and gentle yet firm hand is required to conduct all aural manipulations. In many affections of the auricle and meatus there is superadded to the natural sensitiveness an inflammatory state which makes the handling of the ear a thing to be avoided as much as possible. Rough pulling of the auricle, or any forcible pushing of the speculum, is sure to be resisted by the patient, who may, perhaps, be alarmed at any further interference; but in any case of aural affection all force or roughness is to be deprecated. Those who cannot manipulate with gentleness had better not manipulate at all. A man's entire success with a patient will depend much on the confidence and ease with which he introduces the speculum or the Eustachian catheter; the infliction under any circumstances of unnecessary pain should be avoided. This preliminary can only be secured by keeping constantly in mind, and strictly adhering to the resolution, to *avoid all force*. It is to the rigid carrying out of this principle that most men owe that delicacy of touch which comes from the constant treatment of all delicate and sensitive organs, such as the ear, eye, and urethra. No rough or awkward surgeon will ever make an aurist. Different varieties of specula have been brought into notice since the time when Grüber and Wilde first introduced theirs to the notice of the profession. For practical purposes either those known as Toynbee's (*vide* plate), or modifications of them, as Turner's, will be found quite sufficient. Some surgeons prefer specula with an opening at the side to facilitate examination of the meatus and for therapeutical purposes, or as recommended by Hinton, a speculum with a small piece out of the end in order

that a more perfect view of the membrane may be obtained. I figure (p. 30) some of the best known kinds of specula, and will only add that the utility of a speculum does not depend so much on its form or shape as on the hand that guides it. For children it is necessary to have a speculum with a small, and, I prefer, a perfectly circular tubular end.

Fig. 2.



Brunton's Auriscope.

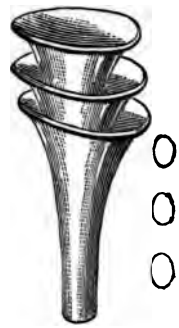
As the first essential towards successfully introducing the speculum in the adult, we must keep in mind the length and direction of the external auditory canal. The following discription of Bernstein is so simple and clear that I venture to insert it here.

Just as the eyelids prevent the entrance of any inju-

rious substances into the eye, so the external ear prevents the entrance of dust and small particles, which might

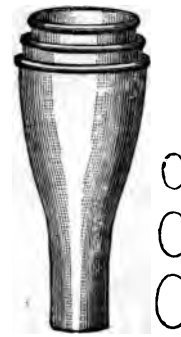
Specula.

Fig. 3.



Turner's.

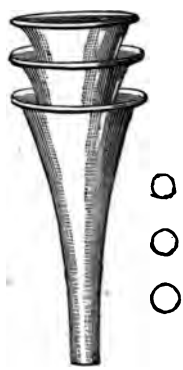
Fig. 4.



Grüber's.

easily be blown through the air into the auditory canal, and to prevent the entrance of insects, not by a closing

Fig. 5.



Toynbee's.

Fig. 6.

Politzer's.

movement, but in the human ear by means of its pecu-

liarly coiled form, which makes the entrance difficult to find. The latter, also, is more or less covered with minute hairs, which serve to catch any dust which penetrates without perceptibly deadening the sound.

"The auditory canal, the first part of which ($\frac{1}{3}$) is composed of cartilage, and the inner part ($\frac{2}{3}$) of bone, is not a straight tube of equal width. It is contracted at the opening, which contraction turns upwards and inwards; then it expands and terminates at the tympanic membrane, the surface of which is placed at an oblique angle to it, and is directed inwards and downwards. On the sides a fatty substance, the wax of the ear, is secreted by small glands, which is intended to keep the sides, and perhaps the tympanic membrane itself, in a supple condition, and to protect it from dryness."

"In introducing the speculum," says Hinton, "it must be remembered that (beginning from without) the meatus winds, first, a little forwards and then backwards, and slightly upwards, so that there is a tendency for the eye to fall on the wall of the meatus, instead of reaching the membrane; and the speculum accordingly must be introduced well into the passage, and directed first a little forwards, for the most part with a slight pressure on the outer part of the posterior wall, to straighten the cartilaginous portion of the canal. This will be much aided by drawing the auricle slightly upwards and backwards with the left hand." We can reverse hands according to the ear examined and the position of the patient.

Tröltsch draws attention to the slow development of the osseous meatus in the child, stating that, "often until the sixth year a gap is left in the ossification, which only diminishes very gradually, and, from its

sharp, irregular edges, might very easily be considered morbid and the result of caries, and at any rate might facilitate the spread of inflammatory processes to the maxillary articulation and the parotid gland;" also that "in very young children the inner half of the exceedingly narrow meatus has scarcely any open calibre, since the membrane, which lies horizontally, is in contact in its whole extent with the membranous floor of the meatus, this contact being due in part to the fact that the epidermis covering the membrane has at this time very considerable thickness."

Having introduced the speculum well into the meatus, we note its shape and size, if narrowed and painful; if the dermis is congested or inflamed; if there is any discharge, and if so, its colour, nature, or smell; if there is a collection of cerumen which interferes with our view of the membrana tympani. If there is any pus or epithelium which blocks up the meatus, it must be carefully removed with the syringe, and the passage cleaned with a little cotton wool rolled on the iris-hook. The canal can then be examined thoroughly for foreign bodies, polypi, molluscous or sebaceous tumours, fungi, exostoses, &c.

The Membrana Tympani.

We next examine the membrane. Here, without departing from my previously stated determination not to introduce any anatomical description, I must notice the points which it is requisite to keep in mind in making an examination. The healthy membrana tympani is translucent and concave. It is placed at an angle of 140°, and fixed to the temporal bone at its circumference, and by its centre to the handle of the

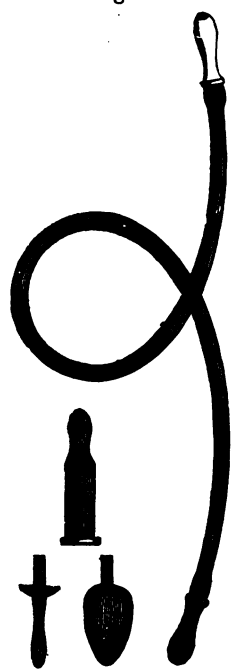
malleus. At the point where the short process terminates, we notice the most concave portion of the membrane, and here we see the well-known triangular spot which gives to the membrane that beautiful and lustrous appearance when light is thrown on to it by the mirror. The bright spot has its base generally directed downwards, but its position and extent are variable, and it is by no means uncommon to find its usual shape altogether lost, or perhaps no bright spot in an ear in which the hearing power is perfectly normal. It serves as a delicate indication of the degree of mobility of the membrane, as it is variously altered when the membrane is forcibly inflated. In a normal state this spot partially disappears on inflation, and the funnel-shaped depression underneath it is bulged outwards. The short process of the malleus is also of considerable importance in a diagnostic point of view, for it separates, as described by Trölstch, the inferior from the posterior pocket of the membrane, the posterior being over, the anterior under the short process. These pockets are formed by the ligamentous folds of mucous membrane or prolongations of the ligamentum mallei anterius. They are of clinical importance, as it is now recognised that here the secretion of mucus is retained (Hinton), and that they are the source of the bulgings of the membrane which we so frequently see when this retention occurs. We may now seek to satisfy ourselves on the following points: (*a*) the appearance and position of the handle of the malleus, if drawn inwards and "shortened in perspective" (Tröltsch); if it appear unusually prominent or altogether displaced and dislocated from its natural position; if it is vascular with vessels on the surface,

and presents a red appearance; (*b*) the triangular spot, if present, its direction and lustre; if the cone has lost its distinctive shape, or if there are two or more of these distinctive spots of light; (*c*) the general colour and appearance of the membrane itself; its degree of curvature, opacity, and thickening; the degree of mobility on inflation; the signs of any deposits, calcareous or otherwise; the presence of polypus; if there be pulsation, rupture, or perforation. We detect the patient's power to inflate the membrane by means of the otoscope (fig. 7). This simple contrivance also enables us to arrive at a conclusion as to the state of the Eustachian tube, The otoscope of Politzer is a simple india-rubber tube, having a small vulcanite ear-piece fixed at the end. Three tubes may be had connected to a central hollow vulcanite ball. This form is convenient, as the patient can place a tube in each ear, and the result of the inflation of the two membranes can be contrasted. It is also useful for teaching purposes, as a student can examine the ear with it at the same time as the surgeon. By placing a tube in either ear of the surgeon, the intensity with which the sound is conveyed is increased, and the least inflation perceived. Double German otoscopes, on the principle of the double stethoscope of Scott Alison, have been contrived and used by Lucae and Turnbull. Of these I have no experience.

The mode of using the otoscope is simple. The patient is desired to shut his mouth, and at the same time to hold his nose firmly, and then to blow (not too forcibly), when the air is at once heard with a gentle rustle impinging against the membrane. The previous insertion of the speculum when this is done will show the degree

to which the patient can inflate the membrane. In the majority of cases we recognise the fact that air has impinged by an alteration in the shape of the membrane or any temporary obliteration of the triangular spot. But there are extremes of rigidity or flaccidity, in which

Fig. 7.

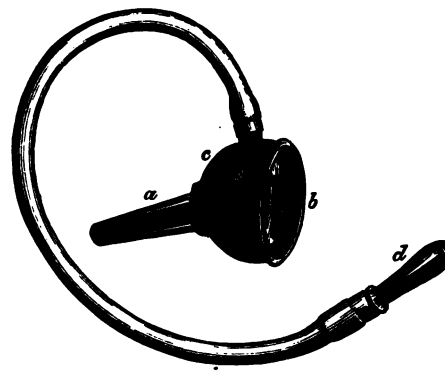


Otoscope Mounts for Nose and Ear-Douche.

it is hardly affected, or it is blown out bladder-like, and yields abnormally to the force of the entering current. We may get a peculiar moist gurgling sound of varying shades of intensity, denoting a moist state of the Eusta-

chian tube, and probably an accumulation of mucus in the tympanic cavity. On the other hand, there is in many cases of old tympanic mischief a dry crackling sound, which accompanies that flaccidity of the membrane above-mentioned, and which I have found present

Fig. 8.

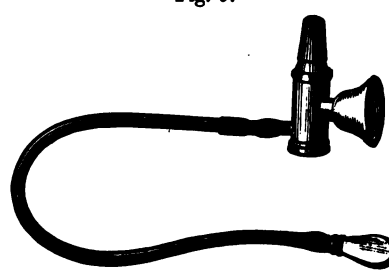


Siegle's Speculum.

in long-standing cases of retained secretion. But familiarity with these various sounds is to be gained only from the constant use of the otoscope; they are to be learned not from description, but from practice. Grüber has drawn attention to the relative value of the secondary sounds which we hear during the recoil of the membrane and ossicles, &c. Though aware of the occurrence of these sounds, I have not observed any fact of practical importance in connection with them. For further determining the presence of adhesions of the membrane and the mobility of the malleus, the pneumatic speculum first introduced by Siegle is very valuable. It consists (*vide* fig. 8) of an ordinary vulcanite specu-

lum (*a*), which screws into a vulcanite box (*c*) covered with a glass lens (*b*), which is also screwed on. By placing a little piece of india-rubber tubing on the tubular part, it fits air-tight into the meatus. The box has an india-rubber tube and a mouth-piece (*d*) connected with it, which is placed in the mouth of the surgeon: suction is applied to the end of the tube, and the air drawn from the meatus, thus acting on the membrane, and with a good light thrown through the speculum this membrane is seen magnified, and any adhesions and

Fig. 9.



Morison's Speculum.—(Modification of Brunton's Auriscope.)
(*Arnold and Son.*)

inequalities which may exist are disclosed. I before referred to its existence in a diagnostic and a therapeutical point of view for the relief of tinnitus, a fact first dwelt on by Mr Hinton. Fig. 9 is a representation of Mr Alexander Morison's speculum, a description of which, in his own words, I quote from the "British Medical Journal" of December 22, 1876:—"This is simply a miniature Brunton's speculum with an exhausting tube having an ivory mouth-piece attached. Near the point where the elastic tubing joins the speculum, there is a small valve which closes on respiration, thus pre-

venting the breath from dimming the reflector. The advantage of this modification is, that, on account of the reflecting mirror in the speculum, and because of the observer looking directly on to the membrane through a lens placed parallel with the surface of the eye, the membrane can be more easily inspected than by direct light and through the obliquely placed eye-piece of Siegle's original speculum." But by far the most valuable means of ascertaining the condition of the membrane and the Eustachian tube, is that devised by Dr Politzer. A bag, such as the one to be presently represented, is furnished with a valve at the bottom. This, or the douche of Mr Lennox Browne, is held in the right hand; the patient is given a little water to keep in the mouth, and he is directed to swallow the fluid immediately on his being called on to do so. The surgeon then introduces the india-rubber tubing attached to the nozzle of the bag into the floor of the nostril, and firmly closes with the forefinger and thumb of the disengaged hand both nostrils. When the patient is called on, or a signal is made to him to swallow, he does so, and immediately, *during the act,* the air is expelled from the bag, and it rushes into the ears.* There is no difficulty whatever in carrying out this simple manœuvre, and even children get quite accustomed to the inflation if in the beginning they are taken gently and gradually taught. Mr Dalby recommends for children the use of an india-rubber tube "with a mouth-piece at one end and a nozzle at the other," and he blows through the tube as they swallow. Figure 10 represents another variety of Dr Politzer's bag; it is furnished with a tube

* See page 98, on Politzer's bag.

and two nose pieces. This the patient can use himself, and by it we avoid the unpleasantness caused by pushing the tube into the nostril. The douche that I generally, of late, give to patients to use themselves is that repre-

Fig. 10.

Politzer's Insufflator, with Allen's Improvement.

Fig. 11.*

L. Browne's Air Douche.

sented in figure 11, but I prefer the plain Politzer's bag (fig. 22) to any other form for my personal use. (These instruments may be obtained of Messrs Khrone and Seseman, Duke Street, Manchester Square.)

* Mr Browne has, since the above was written, improved on this air douche. I prefer the plain Politzer's bag to any form.

CHAPTER V.

EXAMINATION—MEMBRANA TYMPANI.

WITH Politzer's bag we can diagnose any perforation of the membrane which may escape our notice with the speculum, the air as it passes through the aperture conveying a characteristic whistling sound through the otoscope to the surgeon's ear. To examine a patient for perforation we must first carefully cleanse the meatus, and get a full and distinct view of the membrane. If the perforation is large there will be no difficulty in recognising its presence, the clean cut edges marking its size and position. In many instances the membrane may be almost entirely absent, and then we get a view of the red mucous membrane of the cavity of the tympanum which is often thickened and has at times a granular appearance. Hinton says that perforation of the membrane is never absolutely complete. Since I read this statement in 1874, I have had at least two cases in which, after careful examination by sunlight, I could trace no vestige of membrane remaining.* Frequently one meets cases where nothing but the rim of membrane close to its attachment remains. The malleus may be absent, or only a portion of the handle remain, or all the ossicula may have disappeared. I had two cases at the hospital lately which served admirably for demonstration to students of such extensive destruc-

* Such a case is depicted in the *Atlas*.

tion. In both, the inner wall of the tympanum was completely exposed; in one, the fenestra ovalis and promontory were visible, and all the ossicles destroyed; in the other the stapes alone remained, and was seen applied firmly against the fenestra. But often with the speculum it is not easy to diagnose a pin-hole perforation or a slight rent or slit in the membrane. The presence of a minute dot of cerumen, a tiny blood clot on the membrane, a fine foreign body, an old scar or the cicatrix of a healed perforation may each be taken for a small perforation. We must then on all occasions when in doubt about perforation, confirm our diagnosis by Politzerising the ear; one end of the otoscope being placed in the surgeon's ear, and the other in the affected ear of the patient, the ear is, as I have previously described, inflated by the bag of Politzer, and if there be any aperture or chink the air whistles through it with the unmistakable sound of perforation. It is then of importance in any ambiguous case not to arrive at a conclusion until the patient is Politzerised. In the great majority of cases, on fixing our eye well on the spot that we suspect is an aperture, and throwing a good light on it through the speculum, we can see the small bubbles of air issuing from the perforation or fluid oozing through it from the tympanum on inflation. Sometimes the hole is covered by a bright bubble of air, the glisten of which at once shows the seat of the perforation. All deceptive appearances are discovered by the adoption of these two methods: first, by careful examination with the speculum and watching the suspicious spot on inflation; secondly, by the use of the otoscope and Politzer's bag. Not alone may we see the membrane perforated or destroyed, but adhesions may have taken place, either with

or without perforations, which bind the membrane to the inner wall of the cavity or to the stapes and promontory. It may be thick and cartilaginous-looking, a condition frequently accompanying ankylosis of the bones. In arriving at a conclusion from the history, and especially from the nature of the deafness, as to the seat of the malady, when the cavity of the tympanum is affected, we have some general characteristic symptoms which guide us to a conclusion before we test the case with the tuning-fork. Frequently a case is brought to us presenting some characteristic symptom. This may not be necessarily an attendant on the lesions of the tympanum referred to. But there are a certain set of symptoms, some of which are almost invariably met with in every case where we have ankylosis, adhesions, or rigidity of the membrane lining the cavity of the tympanum. I cannot conceive that any more lucid description of the typical symptoms which are complained of by the great majority of patients who have adhesions of the membrane tympani and ankylosis of the tympanic bones can be given than that of Mr Toynbee. There are no more important passages in his unrivalled work on "Diseases of the Ear," than those in which he so clearly depicts those symptoms so well known to all aural surgeons, and which when described by a patient almost infallibly point to the seat and nature of the affection.

"Many patients will most distinctly hear a single voice, although low, but are puzzled to hear anything distinctly when two or more persons are speaking; others hear the voice, but cannot discriminate the words; others again can hear slow conversation, but cannot follow it when rapid. These symptoms show that the *adapting power*

of the ear, dependent as already shown upon the ossicles and their muscles, is at fault. But the history of the case, showing it to be one of slow hardening of the tympanic mucuous membrane, together with the absence of all those symptoms which render it liable to be confounded with other diseases, as nervous deafness, obstruction of the Eustachian tube, &c., are usually sufficient to enable an attentive observer to form a correct diagnosis.

"Thus the patient will hear perfectly a single distinct voice, but a second voice intermingling completely disables him from hearing either; he having lost the power of rapidly adjusting his ear to suit the sound of the voice of the person immediately addressing him to the exclusion of that of the other. Yet another striking symptom of the early stages of the affection is the necessity of exercising an act of distinct volition in order to catch the sound of a voice, which ceases to be perceptible as soon as the effect is relaxed. It has, indeed, happened to me to receive patients whose complaints consisted not in being dull of hearing, since they could hear everything said in a room, but in not being able to do this without a prolonged effort of attention, the fatigue of which soon became intolerable. This latter condition is, of course, perfectly explicable from the more or less rigidity of the chain of bones in this disease, and the muscular effort consequently required to move it and keep it in constant motion.

"Another symptom, and one certainly characteristic of the latter stages of this affection, but which it is not in my power to deny, may not also be present in another disease of the ear, is the immense improvement of the hearing which attends the patient's travelling in a car-

riage over a hard road, by which considerable vibration is communicated to his body; a vibration that doubtless in a degree shakes the chain of bones, and imparts to them a kind of vibratory movement, which permits the muscles, while it lasts, so to act on those bones as to restore more or less of their proper functions in adjusting the pressure on the labyrinth."

*The Tuning-Fork.**

We now come to the most important step in the process of examination. The diagnosis of an obscure aural case is incomplete without the test of the tuning-fork. It is necessary here to repeat what has been elsewhere so well described by Politzer and other recent writers on this subject. "To Lucae," says Hinton, "we owe the first scientific appreciation of this test." That knowledge is founded on the fact that if the external meatus is closed the sound of the tuning-fork placed on the head or against the teeth in the median line of the lower jaw, is increased.

It is not in keeping with the design of this work to enter into the various physiological and acoustic reasons which have been assigned for this. It is sufficient to recognise the fact that vibrations passing through the solid media, the bones of the head, are intensified and the reflections increased when the external meatus is closed, in the normal state, and that those vibrations are prevented from escaping. Whether this obstruction is in the meatus or in the cavity of the tympanum, the effect is identical. Cerumen, a foreign body, polypus, obstruction from epithelium and hardened mucus in the ex-

* It is well to have at hand a few tuning-forks of various sizes and different keys.

ternal passage, or accumulated mucus in the cavity of the tympanum, will produce a similar effect. It is, right, however, to say that in my experience this is not an absolute rule. There are persons whose hearing is very acute, and in whom there are no symptoms of any abnormal conditions, who do not hear the tuning-fork louder on closure. Some time since, in trying the tuning-fork on the heads of some bystanders and explaining the reasons for the use of the instrument in diagnosis, the accuracy of the theory received rather a blow, when, the first person (a student) on whose head it was placed for experiment, and one who had remarkably good hearing and had never had anything wrong with his ears, declared that he did not hear the tuning-fork louder on closure of the meatus, but, of the two, less so. I tried him several times, with the same result. There was no cerumen, the membranes were healthy; all the others present were, however, influenced differently. This is not the only time that this very unusual result has been stated to me.

Nothing in the examination of the ear requires the exercise of so much patience as the trial with the tuning-fork. Each experiment should be repeated a few times, and the patient kept in ignorance of the result expected. Deaf patients, especially the poorer ones, are often intensely stupid. To arrive at a truthful conclusion, we must try their accuracy several times. It is a good plan to return to a previous step in the examination, and to repeat the question as to the intensity of the sound. Constantly, patients will at the same examination contradict assertions which a minute before they have made with the greatest confidence. I find it often at the hospital a trial not alone of the tuning-fork, but

still more of my patience, to elicit the truth which they quite unintentionally obscure. I generally adopt the following method of testing, whether the deafness be unilateral or bilateral:—

1. Ascertain if the sound is heard louder in either ear, the meatus of each remaining open.

2. If the sound is heard louder in either ear, or the contrary, the meatus of each having been closed alternately with the finger.

3. If the sound, as heard with the meatus of each ear closed, is louder as contrasted with its intensity when both ears are open. This I do by making the patient, with his thumbs in readiness, quickly close the ears on placing the tuning-fork on his head, and by testing him alternately with both the ears open and closed.

Let us take a few uncomplicated examples. We have by the speculum excluded any cause which can exist in the external meatus, such as cerumen, polypus, epidermis, or foreign body. We wish to arrive at a conclusion as to whether the deafness and tinnitus are due to tympanic obstruction or to disease of the nerve.

First, a patient hears *badly in the right ear*, and well in the left. With the tuning-fork on the head in the first step of the examination, he hears it *loudest in the right ear*. The *presumption* is—*mucus in the cavity of the tympanum of that ear*. On closing the left ear the sound is intensified in it, equally, if not exceeding, that heard in the right one. On closing the right one the sound is not increased, as a rule. The diagnosis is complete in the vast majority of cases; it is one of obstruction in the cavity of the tympanum.

Secondly, a patient is *deaf in both ears*, with or without tinnitus. The tuning-fork placed on the head is *heard loudly and equally in both*, and there is *no difference, or very slight, on closure of either meatus.* We diagnose *mucus in the tympanum of each ear.*

Thirdly, a patient is *deaf in the right ear*, with or without tinnitus. The tuning-fork placed on his head is *heard louder in the left ear. We assume nervine deafness of the right ear. On closing the left ear, the sound is intensified in it; on closing the right, there is no difference.* In my experience in the majority of cases it is, of the two, *less.* We confirm the diagnosis of nervine deafness in the right ear.

Fourthly, a patient comes to us *deaf in both ears*, with or without tinnitus. The tuning-fork placed on the head, *he hears perhaps badly, and the sound dies rapidly away.* This can be ascertained by testing him as usual, and transferring the fork quickly to the observer's head or teeth, on the patient's making a signal that the sound has disappeared. It is possible *he may not hear the tuning-fork at all* when placed on the head, and we must transfer it to the teeth before the vibrations are conveyed. Closure of either ear produces little difference (*Hinton thinks slightly increases the sound*); of the two, I am inclined more frequently to think, lessens it. We diagnose *nervine deafness of both ears.*

Such is, up to the present, the result of my experience in the majority of cases. On the disputed point of the patient hearing the sound less distinctly on closing the deaf ear (Roosà) in a case of uncomplicated nervine deafness, or its being slightly intensified (Hinton), after examining many hundreds of cases, I believe that the

result is variable. This may arise from some error in diagnosis. Complications may exist which escape observation, and may be outside our power of diagnosis. Such complications existing in the tympanum, and which involve its membrane and ossicles, would influence the result. That they co-exist frequently with nervine deafness is, of course, true, and hence it may be the case, that much of the difficulty lies in this source of error.

Though the above rules as regards the diagnostic value of the tuning-fork are generally found to lead to a correct conclusion, still anomalous cases are constantly occurring in a large aural practice which I do not pretend to account for, and which are more or less at variance with them. For instance, within the past few days these three cases have come under my notice.

CASE 1.—J. N., age 51. Right ear deaf for two years; the deafness came on after cold; he has a "humming" tinnitus; there has been an old syphilitic history, and at present he suffers from his throat from the same cause. He has never had any pain or discharge. With the right ear the watch is heard barely on contact, with the left at half an inch. He inflates both membranes—the right faintly, the left with a moist crackle. The membrana tympani of the right ear is divided into two very hollow pockets; it is unusually white, and the malleus is displaced, the handle being prominent. In the left ear the malleus is not visible, the membrane is considerably drawn in, and extremely concave and dull. The tuning-fork he hears best in the right ear. Closure of either meatus makes little difference, the sound remaining most distinct in the right ear, though not so loud as

when that ear is open; on closing the meatus of each ear the sound is less than when both ears are open.

CASE 2.—J. H., age 49. The left ear has been very deaf for two years, with constant "singing." He found the right getting similarly affected about one year since, when he consulted me, and was then relieved of the tinnitus in both ears and the hearing of the right ear was considerably improved. His hearing distance now is $\frac{6}{60}$ with the right, and the watch is not heard on contact with the left. The tinnitus has returned, and it is for relief from this symptom he has come again. The membranes show but little change from the normal state; he inflates both ears with a dry sound; the tuning-fork is heard loudest in the right (the good) ear; on closing the right the sound is increased; closure of the left, he fancies, rather intensifies the sound in the right; when both ears are closed the sound is slightly lessened.

CASE 3.—P. K., age 16. When seven years old he had scarlatina, and after the attack the right ear remained deaf; he has never had any pain or tinnitus, and does not recollect any discharge; the hearing distance of the left ear is normal, of the right $\frac{1}{60}$; the external meatus of the right ear is healthy; the membrane is congested, the triangular spot is obliterated, and there is what appears to be a small scar of an old perforation; otherwise its shape is normal. He inflates both membranes well; the tuning-fork is heard *alike in both ears.* With the right closed the sound is loudest, with the left ear closed it still remains loudest in the right; when both ears are closed it is louder than when both are open.

These three cases I cite as they occurred while writing

these lines, and I tested each frequently and cautiously to correct any error. They are all very intelligent persons. In these cases I am inclined to believe the mischief was confined to the cavity of the tympanum and the ossicles, probably the effects of long-retained secretion, low inflammatory states of the lining membranes, adhesion, and partial ankylosis of the bones. There was little yielding of the membrane on inflation, no improvement on suction with the pneumatic speculum, and in all three cases its concave and thickened appearance verified the diagnosis. To prove, however, the utility of the tuning-fork, I cite fully this case.

Mrs ——, widow lady, age 52, consulted me in March 1876, for deafness and tinnitus in both ears. On examination I found that the cause of the affection was a slight accumulation of cerumen, the removal of which and subsequent inflation completely cured her. In December last she again consulted me. She then suffered from an "unpleasant, stupid, sensation in the head, giddiness, tendency to fall, and general debility," accompanied by complete deafness in the left ear, and "noises like the sea roaring." There was a history of irregularity during the menopause. Menstruation had ceased for one year and two months previously; she had been slightly unwell during the past month. She had several pregnancies, the last occurring in 1866. She had a general anæmic look and feeble circulation; the heart sounds were normal but weak; there was no albumen in the urine; the secretions were fairly regular. On examining the deaf ear, I found the watch barely heard on contact, the external meatus healthy, the membrana tympani healthy and normal in shape and appearance,

the Eustachian tube free. She could inflate the membrane, but not well, and the normal rustle was represented by a moist gurgle. I assumed a recent accumulation of mucus in the cavity of the tympanum, and a collapsed Eustachian tube. The mucous membrane of the throat was pale and anæmic-looking. On placing the tuning-fork on her head she said "she heard it nearly altogether in the right (the deaf) ear." I passed the Eustachian catheter and syringed out the ear with a warm solution of chloride of ammonium (gr. iv. ad. ʒ i.). I then Politzerised her a few times through the opposite nostril. On testing her immediately after inflation her hearing distance was $\frac{3}{60}$. This treatment, added to general attention to the debilitated constitutional state by tonics, &c., was continued, and gradually the noises completely disappeared. On the third of the month she visited me, the hearing perfectly restored and the tinnitus gone.

CHAPTER VI.

THE EUSTACHIAN TUBE.

To understand the use of the Eustachian catheter, I would recommend all those who wish to study its mode of introduction on the dead body to make the usual sections of the skull required to expose the pharynx and nasal fossa. This is easily done by sawing through the base of the skull behind the styloid processes and the attachment of the pharynx, the other section being made vertically through the nose at either side of the septum. In this way, if the section be carefully made and the soft parts uninjured, the inner and outer wall of the nasal fossa are preserved. The various muscles which act on the orifice of the tube, the posterior nares, the depression behind the tube, and the tube itself can be examined. Beautiful illustrations of these sections can be seen in plates 26 and 28 of Ellis's "Illustrations of Dissections." These I use myself for demonstration.

The chief facts of practical importance which we have to recollect when we undertake the passage of the catheter are as follows:—The Eustachian tube is about one inch and a half in length ("35 mm.; 24 mm. of which belong to the cartilaginous, 11 mm, to the osseous canal," Tröltsch translated by Hinton), the osseous portion in the temporal bone being three-quarters of an inch, and the cartilaginous portion one inch. The tube is funnel-shaped, its narrowest part being at the junction of the

osseous with the cartilaginous portion. This tube passes from the anterior wall of the tympanum downwards, forwards and inwards, to terminate at the pharyngeal orifice, which projects as the opening of the trumpet, close behind the internal pterygoid plate, on a level with the inferior turbinated bone, at the back part of the inferior meatus of the nose. Two lips bound this orifice, one posterior, directed downwards, the other anterior, turned upwards. It measures (Tröltsch) "9 mm. in height, 5 mm. in width." This faucial orifice (Toynbee) is nearly half an inch long. The pharyngeal end is the widest portion of the canal, and is composed both of cartilage and fibrous membrane. The mucous surfaces of the membrane which line this canal are in a state of apposition, the two patent points being the faucial orifice and the commencement of the osseous portion (Tröltsch). This arrangement converts the Eustachian tube into a form of valve, which in a state of rest is closed, and which opens and closes at each act of deglutition, in consequence of the action of the tensor and levator palati muscles, the former dilating the opening (Rüdinger and Tröltsch), the latter muscle drawing the inferior curved edge of the orifice of the tube into a straight line upwards.* The palato-pharyngeal muscle assists in fixing the cartilaginous portion. This action we are frequently performing in the swallowing of our saliva. It is this action of the palatal muscles that we take advantage of in Politzerising and inflating the membrane, during the act of swallowing the water; the orifices of the Eustachian tubes then becoming pervious. We may epitomise the uses of the valvular canal thus :—

* See page 99.

1. It permits of an exchange of air to the cavity of the tympanum; thus it forms an outlet for abnormal secretions and prevents their accumulation in the tympanum.

2. It prevents the rarefaction of the air in the tympanum by the successive acts of swallowing when air can enter the cavity at each act.

3. It maintains a condition of equilibrium between the air in the tympanum and the atmosphere.

4. It may influence the vibration of the membrane and the resulting sonorous effects on the tympanic cavity (Bernstein): clinical analysis would appear to verify the suggestion.

The valvular action of the tube has the most important bearing on our knowledge of Eustachian deafness. Closure or occlusion of the tube leads to rarefaction of the air in the tympanum, which, while it may filter out, is not restored or renewed.* Then follows an accumulation of mucus in the tympanum, and an increased concavity of the membrane, and finally inspissation of the secretion, contraction of the membrana tympani, and thickening and adhesion of the membrane lining the cavity with accompanying changes in the ossicles. Figure 12 represents a form of the Eustachian catheter, the double curved catheter of Dr Noyes of New York. The mode of passing the instrument we shall now proceed to consider.

I prefer the silver catheter to the vulcanite one. I use a smaller catheter than that generally sold, for children, and a very fine one, in cases of obstruction. It will be found useful to have catheters of various sizes

* See chapter on Eustachian Closure; Löwenberg on "Gaseous Interchange in the Tympanic Cavity."

and curves ready at hand. Both the vulcanite and the silver instruments can be curved to suit each case, as they are readily bent, the former being first placed in a little hot water to soften them. It is a matter for surprise that so many surgeons still fear to practise catheterisation of the Eustachian tube. It is true that it requires some little experience to introduce the instrument with ease and celerity; but with ordinary care and tact no harm can be inflicted in its passage, and there is nothing in the operation which a little practice will not enable every one who possesses any manipulative skill to overcome. The errors which I have seen generally committed by beginners are these:—The catheter is taken hold of in too clumsy a manner, and held too firmly during its introduction; it is introduced too slowly; carried into the middle meatus instead of the inferior; it is not passed far enough back, and it is turned towards the ear, anterior to the orifice of the tube; or, on the other hand, it is passed back to the pharynx, and not drawn sufficiently forwards, thereby being turned into the fossa of Rosenmüller behind the faucial orifice of the tube. The essentials to success are—a thorough knowledge of the situation of the opening; a light hold of the instrument, which we introduce with the forefinger and thumb of *either* hand; that the beak of the catheter should be directed well downwards, and then glided along the floor of the nares, keeping it away from the turbinated bone; lastly, tact in avoiding the fossa posterior to the pharyngeal orifice of the tube.

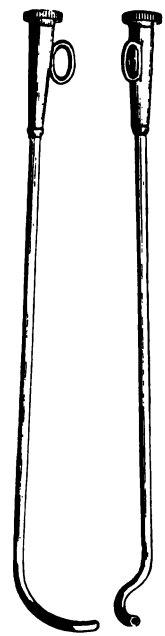
It is of importance to be able to pass the catheter with either hand with facility. Frequently a patient, just as he finds the sensitive anterior part of the nose

touched by the catheter, raises his hand to catch the operator's. It is well to have the left hand in readiness, so that while we restrain the patient with the right, we continue quickly the passage of the catheter with the left hand, which we transfer to it. It is necessary, also, to avoid all useless fuss in cases where we desire to employ the instrument. The catheter should be in the Eustachian tube almost as soon as the patient becomes aware of your intention to introduce it. I now give the description of the best method of introducing the Eustachian catheter. The plan is that which is generally adopted, and is a combination of the methods recommended by Krämer, Tröltsch, Politzer, Löwenberg, and Hinton.

The catheter, held lightly between the forefinger and thumb of the right hand, the left being in readiness to transfer to it, has its curved point, directed downwards, introduced into the nostril; the hand being then raised, the catheter is carried quickly, unless there be any obstruction, *horizontally* along the floor of the nares, all force being avoided, until the pharynx is touched posteriorly. The instrument is then drawn gently forwards, about half an inch, at the same time that it is rotated upwards and outwards, until we know by the direction of the ring on the outer end that it is turned towards the ear. It is then felt in the tube having ridden over the posterior lip, and we verify the success of the operation by inflation. Löwenberg and Politzer recommend a plan which it is well sometimes to adopt, if we miss the orifice, namely, to turn the catheter in, withdrawing it from the pharynx inwards, with its point in a direction downwards, until we feel it against the septum, and

then by rotating the catheter outwards and upwards, to turn it towards the Eustachian tube. Unavoidable difficulties are sometimes met with in the nares, such as abnormalities in the turbinated bone and the septum, or hardened masses of mucus. The ingenious device of Dr Noyes, who, some years since, introduced the catheter

Fig. 12.



with the double curve for right and left tube (fig. 12), enables us as a rule to disregard these obstacles, as it is seldom that both nostrils are affected in this way, and by this modification we can readily catheterise through the opposite one. The catheter is held in the right

hand for the right nostril, and *vice versâ*, at a right angle to the nose, on a line with the floor of the meatus, the back of the hand being turned upwards, the beak of the catheter is introduced at the inner side of the corresponding nostril. The catheter, kept close by the septum, is carried for a short distance backwards, when the hand is brought down, the direction of the catheter being gradually changed to that of the horizontal one maintained in passing the ordinary catheter. With a sweep it is carried round the septum posteriorly, and then rotated inwards, the point readily entering the Eustachian tube of the opposite ear.

I have been using these instruments of Dr Noyes for a considerable time, and I am constantly enabled with them to catheterise cases which would prove very troublesome, if not impossible, to manage without their assistance. The catheter being in the tube, the otoscope, one end of which has been previously fixed in the affected ear of the patient, has now the other end placed in the ear of the surgeon, and by gently blowing through the catheter with the mouth, or through a tube attached to the catheter, or the Eustachian explorer, the air is heard as if it were blown directly through the otoscope to the surgeon's ear. The annexed figure (fig. 13), which shows the insufflator and catheter. I have for some time past been in the habit of employing the instrument depicted in fig. 14, kindly sent to me by Dr Turnbull of Philadelphia. It is a forceps which I find extremely useful for wiping the faucial orifice of the tube, and clearing away any collections of mucus, &c., which may obstruct the orifice. I now make it a practice in those cases where I find a difficulty in passing

the catheter, to mop out well with the forceps the part about the opening of the Eustachian tube with a

Fig. 13.

Insufflator and Eustachian Catheter.*

Fig. 14.

Turnbull's Eustachian Forceps.

small portion of cotton wool, wet with some glycerine, previous to introducing the instrument.

In some persons, where the nostril is sensitive, tender,

* Messrs Khrone & Sesemann.

or obstructed, I find it useful to pass a soft bulbous bougie, well oiled, once or twice before introducing the catheter. A patient who has been a few times catheterised, can tell immediately when the tube is entered and the membrane inflated. Such persons, who are accustomed to the instrument, are the best for beginners to examine, as they are less sensitive, bear the operation well, and can at once tell when it is successfully performed. Double catheters are made on the same principle as those used for washing out the bladder. With these instruments the cavity of the tympanum can be washed out with any solution we please to employ, a continuous stream being thus secured to carry off any secretion which we wish to displace.

Some facts which we must not forget in using Politzer's bag or the Eustachian catheter, I may perhaps as well mention here, before I leave this step in our process of examination. I always Politzerise a patient sitting. I do this, as I do not think there is the same tendency to giddiness, or if there is, the patient does not suffer to the same extent. When in that posture I have seen giddiness and faintness, produced by inflation with Politzer's method, more than once. I have never seen any harm result from the use of his bag further than this temporary giddiness. Here I may remark that we must be careful not to overlook the temperature of the water used in syringing an ear. I have known negligent syringing, with cold water, cause sudden faintness in the patient and a great shock to friends. This can always be avoided by using a metal syringe, and accustoming the hand on the cylinder to act as a gauge of the temperature, before injecting the water into the meatus. Also, before passing water through the ear and Eustachian tube, in cases of

perforation, when we wish to wash out the tympanum, it is of importance to place the patient in a sitting posture, for here also we are likely to produce a sense of reeling and giddiness. Finally, it is not right to use any instruments, throat or ear, which have been used promiscuously with several patients, or at any time in any suspicious case, or where there has been discharge, without first thoroughly cleansing such by dipping them into boiling water, or some disinfectant solution. It is unfair to the patient, and lays the medical man open to the charge of being the cause of transmitting a disease.

We shall consider, further, the various methods of dilating the Eustachian tube, and the application of medicated solutions or vapours to it, or the tympanum, when discussing the treatment of their diseased conditions. In inflating through the Eustachian catheter for diagnostic purposes, I generally blow directly through the tube, applying my lips to the catheter. From long experience of this method I may say that I am quite satisfied with the knowledge that it in nearly every case conveys to me. I believe that if any one educate his ear to the sounds conveyed by the passage of the breath in the various abnormal states of the membrane, the Eustachian tube, and the cavity of the tympanum, which require the employment of the catheter, we can gain but slight additional information from any bag or insufflator which may be used.

Throat.

We have now arrived at the last step necessary in forming a diagnosis, namely, the examination of the throat, and, if necessary, the posterior nasal passages. I assume

that the method of laryngoscopic examination is understood by my readers. It is outside the object of this treatise to enter into a detailed description of laryngoscopy. Such a description may be found in the excellent treatises of Morell, Mackenzie, and Prosser James, or the still more recent manual of Professor Störk of Vienna. As it must be necessary occasionally to practise rhinoscopy in the treatment of Eustachian deafness, and as the art of using the laryngoscope is a less difficult one than that required for rhinoscopic examination, and as the same mirror and illumination can be employed for both purposes, it follows that any practical aurist should first familiarise himself with the use of the laryngoscope. In every case we should place our patient opposite a good light, and, with a depressor getting the tongue well down, examine the state of the mucous membrane covering the soft palate, uvula, tonsils, and pharynx. Frequently we may have only a congested condition of this membrane, and an ordinary catarrhal state, popularly called relaxed; this turgidity leading to temporary closure of the Eustachian tube. This is a frequent accompaniment "of cold in the head." The tonsils may be chronically congested and enlarged. This enlargement does not, as is well known, even when it happens to a great degree, extend so far as to encroach on the Eustachian tube. But, undoubtedly, it is one of the unfavourable attendants on Eustachian deafness, and I have no hesitation in saying, that in these cases of permanent enlargement of the tonsils, accompanied with deafness, great good is, as a rule, effected by removal of the tonsil. I make this statement from practical experience, and have notes of numbers of cases in which the improve-

ment was marked and permanent on removal of the source of irritation in the throat, and subsequent treatment applied to the faucial orifice of the Eustachian tube. We shall again speak of removal of the tonsil when considering the various forms of throat affection that may complicate deafness.

The tongue will, by its white patches and fissured appearance, afford us evidence of an old syphilitic history. There may be a granular condition of the pharynx, with enlargement of the follicles, and suppurative spots may cover its surface. A frequent and unpleasant, as well as troublesome, symptom is the appearance of a slimy discharge pouring down from the posterior nares, often of a dirty green colour. This is known as post-nasal catarrh. The pharynx behind the uvula has a dry, polished appearance, and is marked with this offensive and tenacious discharge; frequently there is a disagreeable odour from the breath, resembling that of ozæna. The presence of any of these naso-pharyngeal complications will suggest to the surgeon a close examination of the nose itself for catarrh, general congestion of the nasal mucous membrane, the presence of any discharge and its source, polypus, or ulceration. The speculum figured on next page answers admirably for nasal examination (fig. 15).*

The light (artificial or sunlight) can be thrown well into the nostril, through the speculum, by the concave laryngoscope mirror. I prefer sunlight, when it is possible to avail of it; we can thus get a good view of the turbinated bones and meatus. By the same light and the laryngeal mirror we may examine the posterior

* By turning the screw (*a*) the blades expand, and a good view of the nostril is to be had by means of the mirror.

nares, pharynx, and larynx. Fortunately, it is not often absolutely necessary to practise rhinoscopy in treating aural affections; yet it is undoubtedly more satisfactory to see with the rhinoscopic mirror the state of the Eustachian tubes and the surrounding mucous membrane when we are treating diseased conditions of these parts.

Fig. 15.

Duplay's Nasal Speculum.

I must be satisfied with but a very brief description of the method of applying the rhinoscopic mirror. The patient is placed, sitting, on a chair with a high back, against which his head can comfortably rest. If sunlight can be availed of, his back is turned to the light; if the light of the argand gas-burner is used, he is placed sitting a little to the side of, and in front of it. The surgeon, using the concave mirror with the spectacle-frame and ball-and-socket-joint sits opposite to him. He next proceeds to throw a strong light on the pharynx, below the

margin of the soft palate. He now takes the tongue, and holds it lightly forward with a small napkin. Having previously heated a small laryngeal mirror over the flame of the lamp, or in a little hot water, he quickly passes it, with the reflecting surface directed upwards, on to the pharynx, behind and beneath the uvula. The patient is now directed to breathe through the nose or to snore a little. By depressing the handle and bringing the mirror more at a right angle he gets, in favourable cases, a view of the posterior nares, Eustachian tubes, and turbinated bones. This is the most favourable result when there is a free space between the soft palate and pharynx. By a little manipulation of the hand, and by elevating or depressing the handle of the mirror, we obtain a good view of the position and state of the parts. But this is exceptional, and, as a rule, we have to bring to our assistance a tongue-depressor (which we must teach the patient to use), or the uvula-noose and blunt hook of Türck, Krämer, Störk, and others. Störk proposes in these cases to pass a riband—three-quarters of an inch wide, with a Belloq's tube—through the nares, bringing one end out of the mouth, and then tying the two ends together. In this way the uvula is held by the patient completely out of reach. Instruments can also be got which combine the purposes of uvula-hook and mirror. Such an instrument has been lately invented by Dr Störk. It serves also as a tongue-depressor, and, the handle being set to the shaft at a right angle, it can be held firmly in the surgeon's hand at the same time that it does not interfere with his view of the mirror.

Past Treatment.

In taking the histories of any case, it is well to ascertain the treatment which has been previously adopted. This is particularly necessary in dealing with patients affected with aural mischief. In many instances it will form a guide to the prognosis that we may be able to give. It will also prevent the repetition of useless remedies, and save the patient from interference, which cannot do good, and which may do much harm. In a large number of cases various empyrical means have been already used to combat the pain or deafness, and it is advisable, both for the confidence of the patient and as a guide to the surgeon, that all information on these matters should be elicited before the treatment of a case is commenced. It is not here necessary to give any caution as to the judicious care which must be shown in asking information on such points. The reputation, the welfare, the character of a brother practitioner, are in our hands; the man who, by look, word, or gesture, forgets the duty he owes that brother, through a base desire to advance his own interests at his expense, is unworthy of the position he holds as a member of our profession.

Having now referred to the steps which it is necessary to take in making an examination, and the several points to which we must direct our attention, I next proceed to allude to other instruments useful in diagnosis and treatment.

CHAPTER VII.

INSTRUMENTS EMPLOYED IN DIAGNOSIS, AND TREATMENT.

It is, of course, necessary to possess a good syringe —I generally employ the one here figured (fig. 16), I prefer it to the many I have been in the habit of using. I rather like the screw nozzle—it does not get out of order so readily as the one which merely fits on. This latter frequently becomes loose after it has been in use for some time. The narrow metal nozzle (*b*) shown in the drawing is also very useful for removing cerumen, and will be found much more efficacious than the one with the larger bore; also the vulcanite nozzle (*c*) with the india-rubber cap can be screwed on to the syringe easily. This nozzle is indispensable for the treatment of cases of perforation of the membrane. The conical india-rubber end fits well into the meatus. The patient is directed to hold the head forwards over a vessel, and the stream is passed through the ear, and flows from the Eustachian tube through the nostril. We thus are enabled to wash out the cavity of the tympanum, remove secretions, and clear the Eustachian tube.

Figs. 20 and 21 represent the lamp which I have previously described. To all country practitioners and to those summoned in a hurry away from town, this lamp is of great value, and will be found quite sufficient

for all purposes; it is equally useful for examination of the throat and eye.

Fig. 16.

Syringe.

Figs. 17 and 18.

a *b*

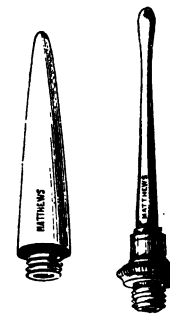


Fig. 19.

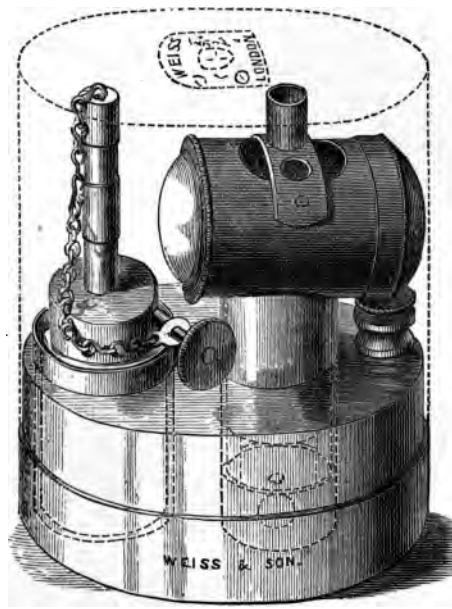
Vulcanite Nozzle with india-rubber cap.

The annexed sketch (fig. 22) represents the ordinary bag of Politzer for inflating the membrane, a piece of india-rubber tubing can be attached to the vulcanite end.

Fig. 23 is the form of otoscope which will be found most convenient in practice and for purposes of demonstration.

The application of an artificial membrane in cases of perforation of the membrana tympani, I shall have occasion to speak of again in treating of affections of

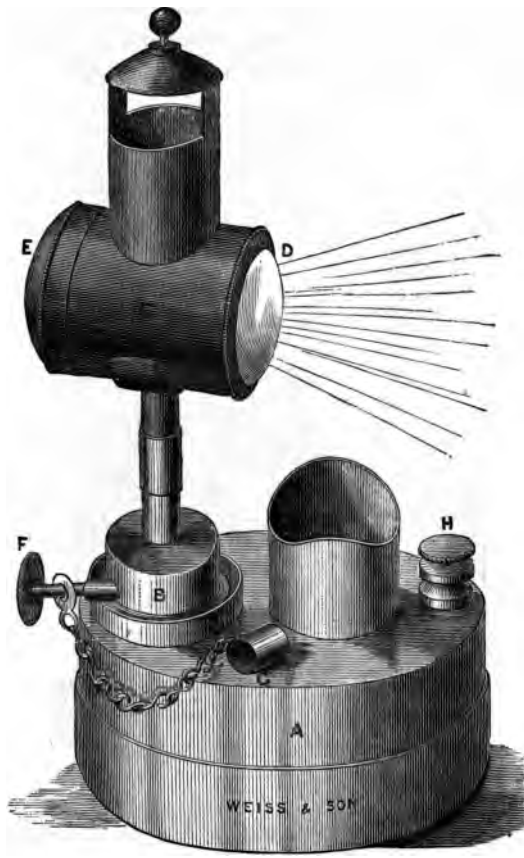
Fig. 20.



this part. I here figure some of the most useful and generally employed membranes. In applying a membrane for perforation, we have at all times to remember the fact now decided, that it is by pressure on the

ossicles, and more particularly on the stapes, that improvement is to be looked for. We do good, not by

Fig. 21.



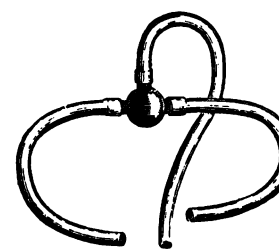
closing the aperture, but by the direction of the applied pressure; this direction being in nearly all cases more

or less experimental, we must not be satisfied with a few trials with the cotton wool or disc, but we may have to re-apply it several times to ascertain whether it improves the hearing or not. Figs. 24 and 25 are forms of Toynbee's membrane with the india-rubber disc. The former I prefer; it has a short piece of silk thread attached to it which is easily passed through a little silver tube, and so carried down to the aperture in the membrane, the tube is then withdrawn and the small piece of silk thread which remains is not perceived in the ear. Fig. 26 represents the membrane of Mr Yearsley, and will be found better than any other kind

Fig. 22.

Politzer's Bag.

Fig. 23.



Otoscope.

in many cases; it is a simple little egg of cotton wool which has a thread attached to it, and it is carried down as in the last case by a tube or inserted by a fine forceps. The ball of cotton wool can be first moistened (Hinton) with a solution of sulphate of zinc in glycerine (iv. gr. ad. ℥j). It may at times be left in for some days; whereas it is better to remove Toynbee's every

night. Fig. 27 is Field's membrane. The following are the advantages claimed by Mr Field for this kind over

Fig. 24.

Toynbee's Tympanum.

Fig. 25.

Toynbee's Tympanum.

Fig. 26.

Yearsley's Tympanum.

those of Toynbee or Yearsley :—"It is simply a combination of Toynbee's artificial membrane, viz.—a thin disc

Fig. 27.

Field's Tympanum.

Fig. 28.

Turnbull's Tympanum.

of india-rubber mounted on a fine silver wire stem, with Yearsley's cotton wool. In my instrument the wire is

carried beyond the india-rubber for about a quarter of an inch, and terminates in a second disc made of flannel. The space between the two is filled up with a small portion of Dr von Brun's wound-dressing cotton wool, which is absorbent, and so takes up and communicates to the flannel disc any medicated solution which it may be desirable to apply.

"Its advantages are the following:—

"1. It does not irritate the membrane, and being very soft is not likely to injure it.

"2. It is made of cotton wool, which is absorbent; lotions can by its aid be constantly applied with much advantage.

"3. By thus keeping the part clean, the membrane gets into a healthy state, and the perforation heals.

"4. The hearing distance is improved.

"5. It is not liable to leave the india-rubber disc in the meatus.

"6. It is easily used, and does not require the forceps as Yearsley's cotton wool does."

In a communication on a new artificial membrane, in the "Philadelphia Medical and Surgical Reporter," December 1876, Dr Turnbull makes the following observations, which are of so practical a nature that I am glad to insert them here. His membrane is shown in fig. 28. It will be seen that the stem is at the side, not in the centre of the disc.

The first important improvement was to make the stem of steel, also the support of the disc of the same material, so as to act as good conductors. The second improvement was to cover the whole with the thinnest rubber by means of heat, so as to protect the metal from

the action of the discharges. The third is a delicate metal wire, supporting the thin rubber drum, and preventing curling up. The stem can be long or short, as desired, as it can easily be cut with a strong pair of scissors.

"*There are a few practical hints which are well to be remembered when artificial membranes are employed.*" In introducing the plug of cotton wool, always moisten it with water, glycerine, or a weak solution of sulphate of zinc in water. The use of a small pair of tweezers, or small forceps, assists the surgeon or patient to place the cotton in the right place. One or two trials may be necessary before the exact spot is found. A disc of rubber or the plug of cotton wool is not, like the new artificial drum, susceptible to vibrations of sound. In applying the new membrane, we must have it made of the proper size. Before introducing, moisten the drum portion only, and carefully, with warm water and glycerine, by means of a brush, and then press it gently down the meatus; when it has arrived in the right place, there is generally a little click, from the escape of the compressed air. No force must be employed in the introduction, and we must be guided by the sensations of the patient as to the hearing being improved or not. The pledget of wool or new artificial membrane should not be so large as to entirely fill up the meatus, or perforation. An open space should be left between the wool and the walls of the meatus for sound to pass to the tympanum. The cotton wool or artificial membrane should be taken out at night. If there is any odour or pus on either side, it must be washed off; and in the case of the cotton, it had better be renewed with fresh

material. The artificial membrane must be covered from extreme heat, dust, and very dry air. If granulations are found on the surface of the middle ear, projecting through the perforation, these must be removed by the use of a small portion of powdered sulphate of copper on a brush, or by dipping a long camel's hair brush in water, and applying it to a crystal of sulphate of copper, and then to the granulations, after wiping out any pus or adherent mucus. If the bone is not involved, and these granulations cover the whole surface of the perforated membrane, a strong liquor plumbi, or solution of sulphate of zinc, can be employed by the patient at night, and applied after cleansing, by means of "Clarke's douche." This application can also be performed with the long brush, passed well into the meatus, from time to time, until the surface becomes healthy. Another important point in the treatment is to relieve any obstruction of the Eustachian tubes, either by Politzer's method or with the catheter.

Fig. 29.

Aural probe of Author.

The annexed probe made for me by Messrs Weiss, will be found very useful for cleaning the membrane. It is simply a double silver probe with a screw thread at the point mounted in a handle. Cotton wool can be rolled round the roughened end, and by it all discharge can be lightly cleaned from off the membrane and meatus. It is useful also when we desire to touch a perforation, or the remains of a polypus, with any solution or acid.

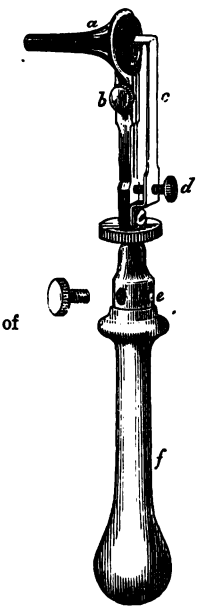
The Rheophore.

Of late the treatment of tinnitus aurium by galvanisation has been extensively practised. I have given electricity a trial in several cases during the past year, I cannot as yet speak confidently of the result. Combined with other treatment, in some few cases it appeared to have a good effect; in others it has totally failed to influence either the tinnitus or the deafness. I must wait for an enlarged experience before expressing an opinion of its utility. Beyond question, however, it is a therapeutical agent, which, as it is simple in application and perfectly safe, should not be left untried. Mr Field, of St Mary's Hospital, who has written on the subject, and employed electricity in a large number of cases, attributes its good effects to stimulation of the intrinsic muscles of the ear. In some cases there is, he considers, a paralytic condition of these muscles. It is to restore this function that he galvanises the membrane. Dr Turnbull, whose reophore, which he kindly had made for me by Kolbe of Philadelphia, is depicted here (fig. 30), has reported some cases treated successfully by electricity. He approves of its application in those persons in whom we suspect "exhaustion of the brain from over effort or some drain on the nervous system." The best battery to use is Dr Stöhrer's double-celled induction apparatus.

The reophore "is placed in the auditory canal, which, being previously half filled with warm salt and water, the metallic wire which projects is insulated by the vulcanite envelope. By means of the metallic screw a connection is made with the conductor of the galvanic

or inductive apparatus, and the circuit is closed by placing upon the mastoid process the other moist sponge, which communicates with the second conductor, and the galvanic current impresses not only the muscles but the portia dura nerve by means of a few fascicules of

Fig. 30.



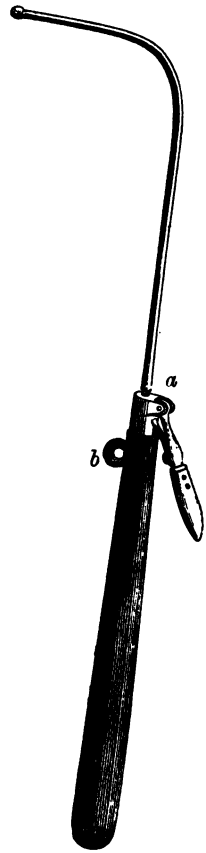
a. Vulcanite speculum (insulator).
b. Screw to secure speculum.
c. Metallic stem.
d. Screw which projects wire stem.
e. Screw for fixing in the conducting wire of battery.

Turnbull's Rheophore.

fibres which Wrisberg called the 'portio intermedia,' forming a connecting link between the auditory and the facial nerve." Mr Field uses a vulcanite speculum with a piece of platinum wire which is attached to one of

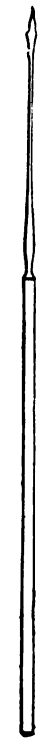
the wires of the battery. A silver probe is employed to complete the current to the membrane.

Fig. 31.



Galvaniser of Mackenzie, reduced for the membrane.

Fig. 32.



Myringotome.

The accompanying figure (31) is a drawing of an instrument made for me by Messrs Khrone and Sese-

mann. It is simply a miniature Mackenzie's galvaniser for galvanising the vocal cords. The fine probe point can be carried down to the membrane through a speculum, and the entire instrument is insulated up to this point. Communication is made with a battery by a coil of wire hooked on to the loop (*b*), and contact is made and the current completed by depressing with the finger the lever handle (*a*). The india-rubber band which is used by Dr Mackenzie to hook round the neck in galvanising the vocal cords, and which has a piece of sponge in the centre which is connected with the battery, I place round the head, bringing the moist sponge over the mastoid process, hooking the band under the chin; whichever method is adopted, a very mild current must be used at first. Some patients complain greatly of the pain. Others will not bear the rheophore at all. However, it will be found that if too severe a shock be not given on the first application, the patient becomes more amenable, and the strength of the current can be increased.

When and how are we to incise the membrane and make an artificial opening into the tympanum? This is just one of those disputed points which I determined to avoid dwelling on in this work, intending it as I do for practitioners whose minds should not, if possible, be burthened about operations which they are not likely to be called on to perform, and the decision as to the propriety of which involves a more lengthened and varied experience than is likely to fall to the lot of most surgeons. Still this much can hardly be said of incision of the membrana tympani. Beyond question, every surgeon who undertakes the care of

aural cases should be ready to carry out this step safely and efficiently. It is not a difficult one, and the landmarks to guide us in its performance are clear and distinct. I will give in a few words my experience of the safety and utility of this procedure. Before doing so, I may perhaps say that the fact of Mr Hinton so emphatically advocating, as he always did, the propriety and advantage of this operation in cases of catarrh of the tympanum and collapsed membrane, must make us regard it in a most favourable light as a recognised operation, and one which can alone relieve certain morbid states which cause or accompany deafness. In many cases of catarrh of the tympanum, accumulation of mucus, or collapse of the membrane, incision has been followed, in patients on whom I have operated, by results far exceeding my most sanguine expectations. At the same time, I have to acknowledge many negative trials and disappointments. I had the advantage of his advice in carrying out this step in some of my earliest cases some years since. He may have been too enthusiastic as to the ultimate results which this operation would secure in aural surgery, yet undoubtedly this enthusiasm was warranted by the brilliant success which attended his treatment of a large number of otherwise hopeless cases, by incision of the membrane and the subsequent thorough cleansing of the tympanum of all accumulated secretion. Nor has the history of the operation and its success with others proved that he over-estimated its value. On the contrary, in the hands of such authorities as Politzer, Schwartze, Gruber, Turnbull, Weber-Liel, Tröltsch, Dalby, and others, its value has been completely established. I cannot say how often I have

incised the membrane during the past nine years both in hospital practice and private. But of the many patients on whom I have operated only two suffered to any extent. One of these was an early attempt, and I made the mistake, against which I was subsequently warned by Mr Hinton, of performing the operation a second time and leaving too short an interval to elapse. The other was in the case of a lady with a very thick membrane, and, in making the incision, I think I cut a little too freely. These are the only cases I can recall to mind in which I had subsequent inflammatiou. In the one, inflammation extended to the mastoid cells and tympanum, and there was a profuse discharge for days, resulting, however, strange to say, in a decided improvement of the hearing. The other case had only a slight attack of inflammation of the membrane and meatus, which subsided under treatment. I always perform the operation thus: setting the patient opposite a good light with the head fixed, and with the mirror throwing the light well down on the membrane through a speculum, I carry a small lance-headed knife, like a very fine cataract knife, steadily down to the membrane with the edge of the blade turned up. I then puncture the membrane, generally behind the handle of the malleus, and carry the blade up to any extent I see fit. There is no bleeding, and but very little pain. The myringotome is shown at fig. 32 (page 77). This is not the instrument, however, that I prefer. I like a knife with a long handle, and shaped like a small cataract knife, with but one cutting edge.

Thudichum's nasal speculum (fig. 33) has been already

referred to, but in some cases, especially when the nostril is irritable or tender, that form made by Weiss, shown

Fig. 33.

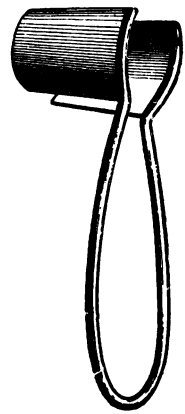


Fig. 34.

Nasal Specula.

in fig. 34, will be found preferable; it gives a good view of the nares and turbinated bones.

CHAPTER VIII.

TENOTOMY OF THE TENSOR TYMPANI.

HAVING in the last chapter referred to the operation of incision of the membrana tympani, it may be right here to say a word regarding tenotomy of the tensor tympani. I wish to remark that this is an operation the utility of which I have myself no practical experience. I have hesitated to practise tenotomy until more definite results are obtained from its performance, and the cases in which it is indicated are more clearly defined. It may be of interest, however, to describe the steps of the operation, and to give some of the most recent views regarding the benefit derived from its performance and the pathological states which indicate the adoption of this plan of treatment.

Aural surgery is mainly indebted to Dr F. E. Weber-Liel for the introduction of this operation, and to Hyrtl for maintaining that, in spasmodic contraction of the tensor tympani, its performance would be attended by useful results. I make no apology for quoting from the translation by Prof. Alex. Loös and Laurence Turnbull, of Weber-Liel's paper in the *Monatsschrift für Ohrenheilkunde*, which translation appeared in the "Half-Yearly Compendium of Medical Science" of 1873. Dr Weber says—

"The consideration which caused me to adopt the

operation of tenotomy of the tensor tympani muscle, as one that offered important therapeutic chances, was decided by the following considerations:—

"First, (*a.*) That according to the experiments of distinguished investigators, it seems established that the musculus tensor tympani, under a normal condition of things, keeps not only the membrana tympani and the series of bones with the apparatus connecting them, but also the labyrinth by means of the stapedial bones, under a certain degree of permanent tension; and that accordingly it is also correct that an anomalously strong tension of the muscle brings not only the membrana tympani into a hypertension which hinders the normal reception of sound waves, but likewise places the bones of the ear in too high a degree of tension, which does not promote the transmission of sound-waves, and also at the same time subjects the intra-labyrinthine phenomena to an increased pressure.

"(*b.*) That it may be assumed (see my argument for this assumption in the dissertation "On Secretions" in No. 11, 1870, and No. 1, 1871, of this monthly),* that a permanently increased tympanal and intra-tympanal tension (especially with a frequently occurring simultaneous disturbance or interruption of the ventilation of the Eustachian tubes, *i.e.* with an obstructed access of air into the cavity of the tympanum, with the unavailability of respiratory and motory forces for the intra-tympanal circulation of the blood, on account of limited vibrations of the membrana tympani, &c.), may also furnish the first and continued cause, even without this concurrence of vasomotor disturbances or obstructions

* *Monatsschrift für Ohrenheilkunde.*

in large vessels, for an alteration of the intra-tympanal circulation, and thereby for disturbances of the tympanal and intra-tympanal sustentation, for the superinducing of hyperæmia and secondary catarrh, and in consequence of this for the thickening and induration of the living membrane of the intra-tympanal structure.

"(*c.*) That likewise an increased pressure within the labyrinth, transferred and sustained by the tensor tympani, may finally not only lead to alterations of the circulation and oscillations within the labyrinth, especially when the possibility for a compensatory or collateral yielding to the excessive pressure is made difficult by other disturbances (such as intracranial excess of pressure, hyperæmia in the brain, &c.), but also by the very same cause the reception of sound-waves and the oscillatory capacity of the intra-labyrinthan apparatus must necessarily be lessened.

"(*d.*) That it may be admitted that by the concurrence of all these causes a very great decrease in the faculty of hearing must gradually be developed, while at the same time, in consequence of the irritations by intra-labyrinthan pressure and of the obstruction of circulation, subjective noises in the ear, and symptoms of dizziness are noticed. This may, *e.g.*, be illustrated by cases in which the cavity of the tympanum is exposed and only the stapes is preserved; if a pressure is exerted upon the head of the stepes by means of a blunt probe, the patients immediately complain of noises in the ear which previously did not exist, and also in some cases of considerable congestion or dizziness.

"(*e.*) That, finally, it is probable that an immovableness of the bones of the ear which is permanently

sustained by an active or passive tension, or shortening of the tensor tympani, may furnish the only or accessory cause not only for the ankylosis of the articular connections of the bones of the ear, but also on account of the simultaneous permanent pressure of the stapes into the fenestra ovalis, on account of the continuous locally sustained irritation of pressure, and of a superinduced sectional afflux of fluids and obstructed communications, for the vascular anastomoses, mediated by the membrane of the fenestra ovalis, for the development of a synostosis (synosteosis) in the connection between the stapes and vestibule (especially with predisposed gouty or rheumatic individuals).

"Secondly, That on the other hand the observation of patients, especially those submitted to *post-mortem* examination, shows that the tensor tympani muscle may be completely inactive, atrophied, or in a state of fatty degeneration, and that with the ulcerative destruction of the membrana tympani and of the bones of the ear, even its tendinous termination may be completely lost, and yet, provided the stapes only exists and is movable, the function of hearing may be preserved in a degree sufficient for intercourse (the hearing being preserved for two inches, the normal hearing distance being forty).

"This would show that the principal perceptible functions of the tensor tympani commence only at a certain 'quale et quantum' of the requisition made upon the organ of hearing: and experience further shows that even in spite of an accidental single injury and destruction produced by the penetration of foreign bodies into the tympanum, a subsequent appropriate treatment may prevent the occurrence of dangerous inflammatory symp-

toms of reaction, principally by the prophylactic inner application of oleum terebinthinæ.

"That, finally, the preliminary experiments in the performance of tenotomy of the musculus tensor tympani on a dead body enables us to find a *modus operandi* by means of which the cutting of the tendon of the tensor can be done without touching other important formations of the tympanum, without laxation of the bones of the ear, especially without tearing the stapes from the fenestra ovalis."

Hence he considers that tenotomy of the tensor tympanum is indicated in (*a*) those cases of "progressive disturbances" of hearing accompanied by subjective phenomena "with and without additional symptoms of dizziness," or tinnitus aurium, and where all other therapeutic means had failed;

(*b*) Those cases in which objective symptoms such as contraction of the membrana tympani: fixation and retraction of the malleus, and where "the anterior portion of the membrana tympani stands back from the sharply projecting edge of the handle of the malleus and is immovable." In these cases he points out that the state of tympanal and intra-auricular hypertension before referred to exists, and that in removing the tension caused by the retraction of the tendon of the tensor tympani, we at least remove one factor, and that a powerful one, which increases the pressure on the labyrinth.

The most favourable cases for tenotomy he considered would be such as were only partially relieved by the air douche, and in which a temporary, but not a permanent, improvement was effected. The following,

quoting from the same translation of Drs Loos and Turnbull, is the description of the operation as originally performed by Dr Weber-Liel :—

This operation requires,

1. *A tenotome,* constructed in such a manner that the manipulations and excursions necessary for securely holding and cutting the tendon of the tensor can be transferred and performed outside of the "meatus," which does not well admit of any other procedure on account of its narrow and tortuous construction. After many preliminary experiments upon the dead subject, I had two tenotomes made (an illustration of one of which is figured in the drawing).

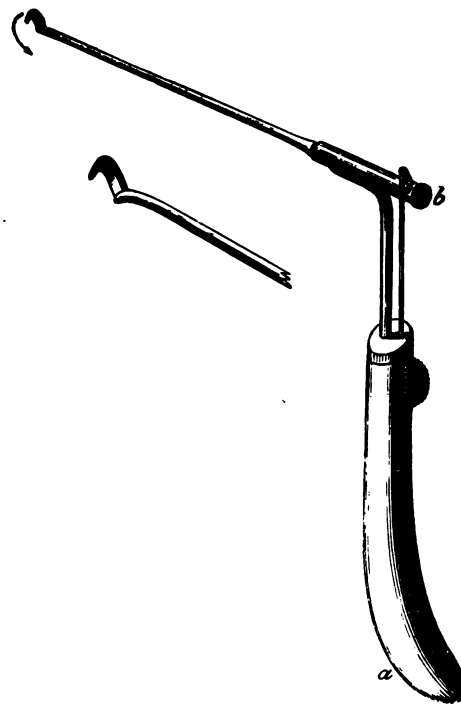
It is connected with an angular lever, *a* and *b*, according to the pattern of the myringotome devised by Dr Wreden; the other with a lever to be moved by a cogged wheel. Although both instruments proved equally efficient in the experiments upon dead bodies, and though the latter admits still more easily and securely the necessary quarter-turn of the tenotome within the tympanum, I have thus far used only the rectangular lever with living persons, because my first operations with it inspired me with confidence in the necessary manipulations, and because after a successful operation according to a certain method one does not like to abandon it for another.

2. *Aural specula* for the external meatus. I have had them made of very thin caoutchouc, and so short that they do not protrude beyond the level of the meatus, else they hinder the necessary manipulations to be made with the tenotome outside of the meatus.

3. An apparatus by means of which the patient's

head is secured in the position most favourable for the operation in such a manner as to prevent any motion on their part which might endanger its success while the knife enters the cavity of the tympanum and performs the cut.

Fig. 35.



Weber's Tenotome.

Connected with this apparatus is a tongue-shaped clamp which holds the external ear from behind, and for the sake of straightening as much as possible the

meatus, which is otherwise angular, keeps it drawn backward, outward, and upward.

Connected with this head-rest is an aural mirror by means of which an observer can follow the steps of the operation.

After fastening the patient's head, by means of the head-strap, obliquely into the head-rest (secured to a table which, if possible, is itself securely fastened) in such a position that at the same time the patient's shoulder, which must be as low as possible, does not hinder the motions of the operator or of the instrument, and so that the daylight of a sunny sky can enter the meatus and clearly illuminate the membrana tympani *in toto*, the operator seizes the tenotome, which is adjusted straight, as shown in the illustration, at the handle in such a manner that the thumb of the corresponding hand rests upon the head of the lever slide. For the tenotomy in the left ear I use the left hand; for that in the right ear the right; it seems necessary to me that the physician, in order to be able to perform this delicate operation in every case elegantly and securely, should be ambidextrous.

The tenotomy is performed in four steps:—

First step.—Introduction of the tenotome, its handle, behind and outside, in a position more or less approaching the horizontal, into the meatus, and piercing the membrana tympani with the upper sharpened edge of the hooked knife about one and a-half millimetres in front of the handle of the malleus, somewhat below and to the side of the short process.

Second step.—Pushing through of the hooked knife into the tympanum. While the handle of the instru-

ment is lowered and inclined forward, the hooked knife, conducted by most accurate knowledge of the anatomical relations, forthwith extends over the tendon of tensor, controlling it from the front; while the operator accurately "feels his way to ascertain whether the tendon is indeed under the control and within reach of the hook, he must see that the hooked knife comes neither too near the insertions of the tendon at the handle of the malleus (so as not to injure the chorda tympani), nor too near the wall of the tympanum. In neither of these two cases can the operation be successfully performed, since at the subsequent quarter-turn of the hooked knife, although edge and point are made so as to turn somewhat outwardly, it is either entangled in the lower back part of the membrana tympani, which is umbilically drawn inward, or pushes against the wall of the labyrinth and the stapes,

Third step.—While the hooked knife is firmly adjusted upon the tendon of the tensor, the operator exerts a light, drawing pressure upon it, and while the handle of the tenotome is directed forward (toward the patient's face), the bottom of the lever (in the groove of the handle) is pressed downward; this causes the hooked knife to make a quarter-turn forward, and the tendon of the muscle is cut still more securely by the lower edge of the knife, so that it cannot well escape. In the moment of the successful cutting of the muscle a distinct cracking noise is usually heard.

Fourth step.—While the operator must endeavour to keep the little knife intra-tympanal as much as possible in the anterior part of the cavern tympani (in order not to strike the connection between the incus and stapes,

or the stapes itself), the lever button at the handle of the instrument is pressed somewhat backward so as to restore the hooked knife to its former position, and to make its removal from the slit-shaped wound of the membrana tympani easier."

"The operation is performed without anæsthesia; even very sensitive patients assert that it is not particularly painful."

In the "Philadelphia Medical and Surgical Reporter," of January 1877, Dr Turnbull contributes a valuable article on this subject. Dr H. Schwartze, he says, attributes the good results rather to the incision of the membrane than to the division of the muscle, but in this he (Dr Turnbull) does not agree with him, inasmuch as he had previously incised the membrane, in the cases published by him, without a good effect. He refers to Dr Kessell's experiments on the lower animals, in which considerable injury was done to the ossicula, without any bad results, and in which the endo-lymph escaped, to prove that there is not the danger attending division of the tensor tympani that we might imagine.

Dr Schwartze's results have not, however, been favourable; quite the contrary: "he has never, in any case operated on by him, been able to bring about a permanently favourable result." On the other hand, cases have seen recorded in which "violent inflammation, extending itself from middle corto-labyrinth, with extensive impairment of the hearing, and an aggravation of the subjective noises" has taken place. Dr Schwartze uses a very simple tenotome (fig. 36).

"A separate instrument is required for each side. He first makes an incision, with the paracentesis needle,

behind the upper end of the handle of the hammer and short process, and then introduces the tenotome into the cavity of the tympanum, with the bent point upward, and in a direction toward the tensor tympani, and afterwards turns it at right angles, so that the edge lies over the tendon. This is then divided, by a sawing motion, without, however, the exertion of much pressure."

Fig. 36.

Schwartze's Tenotome.

Fig. 37.

Hartmann's Tenotome.

He does not use chloroform, or fix the head.

"Immediately after the cutting, he can generally see (unless the membrana tympani is very opaque) the accumulation of blood behind the membrane; this, however, becoming absorbed in a few weeks."

In the same paper, Dr Turnbull gives the experience of Dr Hartmann on this operation. From a series of experiments Dr Hartmann concludes that the disrepute into which the operation has fallen, depends on the non-division of the tendon, or its incomplete division. He lays stress on the following points:—

The incision must be made through the posterior segment; the tenotome must have a curve to reach the tendon, which lies high (1 mm. above the upper edge), the cause of failure in many cases arising from making the incision too low. He thinks Weber-Liel's instrument too complicated, and with it there is risk of injuring the malleus and malleo-incus joint.

Taking these points into consideration, he operated on a patient given him by Politzer, from the posterior segment, with an instrument curved slightly on the flat surface, 2 mm. wide, and so sabre-like curved that, holding it in the position for operation, the point will rise above the upper edge about 1 mm. An instrument is required for each side and fitted in a handle (fig. 37, page 93.)

For the operation, puncture 1–1½ mm. behind the handle of the hammer, just below the level of the short process; push the instrument, with the handle slightly elevated, to the middle of the cutting part of the blade, at the same time keeping the handle close to the posterior wall of the canal. Now the handle is lowered, the instrument slowly drawn back, and at the close the handle is again elevated. In this way the tendon is cut from below, in a direction from front to back, avoiding the inner extremity of the upper wall of the passage, and the neck of the hammer which lies close to it. In

performing this operation, we have to avoid puncturing too close to the hammer, for fear of striking it on the other side of the membrane. After passing the knife about 3 mm. into the tympanum, the handle is moved to the posterior wall of the canal, to avoid the promontory; the chorda tympani was, in several cases, not touched, nor was the long leg of the incus.

He claims the following advantages:—

1. Simplicity and ease of performance, owing to the very slight change in the position of the knife after entering.

2. The instrument having a gradual curve, is not so liable to injure the parts, in case of sudden inadvertent motions, as those with sharp angles.

3. The operation can be done without confining the head, and thus rids patients of their greatest dread.

4. As the cutting is done by a drawing motion, and not by pressure, lacerations of the membrana tympani and ossiculi are more easily avoided.

He is of the opinion that we can only judge of the importance of tenotomy by excluding the influence of other factors which come into play in the performance of the operation. He refers here particularly to the paracentesis of the membrana tympani, and, in the posterior operation, to the division of the posterior fold. He thinks, before tenotomy is attempted in any case, the paracentesis, or division of the posterior fold, should be tried.

CHAPTER IX.

INSTRUMENTS—*continued.*

THE rectangular forceps of Hinton, already figured, will be found in some instances a convenient instrument for removing polypi from the meatus and membrane. But the lever ring forceps of Toynbee (here figured, fig. 38) is the instrument I always use for this purpose, especially if the polypus is very small, or of the "mulberry" kind, and growing from the cavity of the tympanum or from the membrana tympani. There is no difficulty is using this forceps. Pressure applied to the lever (*a*) pushes forward the tube (*b*), and closes the serrated rings on the polypus. The patient is made to stand with the head inclined a little to one side; a large-sized speculum is introduced into the meatus, and the light well thrown into it with the spectacle mirror. An assistant may now support the head of the patient, and when a good view of the polypus is obtained, the forceps is carried steadily down to it with the rings slightly apart; the rings being now fairly opened, the polypus is grasped by pressure on the lever, and removed. The forceps, in the case of two or three polypi growing from the membrane or meatus, may have to be introduced some few times in order to remove the entire of the growth. If bleeding obscures the view, it is well to wash out the meatus and then

dry the surface of the membrane or the bleeding part before re-introducing the instrument.

To illustrate the use of the lever ring forceps I may cite this case, which has recently come under my notice. A boy with complete perforation of the membrane in both ears applied for relief at the hospital. He had been previously subjected to treatment, and was under my care some years since, when he was threatened with brain mischief with severe otorrhœa. On syringing the left ear I perceived in the cavity of the tympanum, which was quite exposed, and growing from its roof anteriorly, a small tumour, quite white, on the surface of which I could distinctly trace vessels. I had never before seen a case of this nature, and at once suspected a cystic tumour growing in the tympanum. . I made with a fine lance-headed knife an exploratory incision, and found that it entered easily into the mass. I now passed in a Toynbee's forceps and squeezed out the sebaceous contents, part of which came away with the forceps on withdrawing the latter, In order to ascertain the nature of the growth, I now again introduced the forceps, and closing the rings on the sac completely removed it from the cavity of the tympanum.*

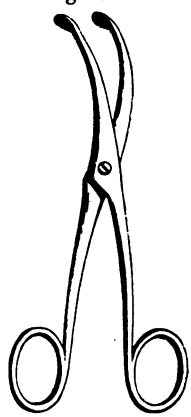
Fig. 38.

Toynbee's Forceps.

* There is in the *Atlas* a drawing of the tympanum before and after the removal of the tumour.

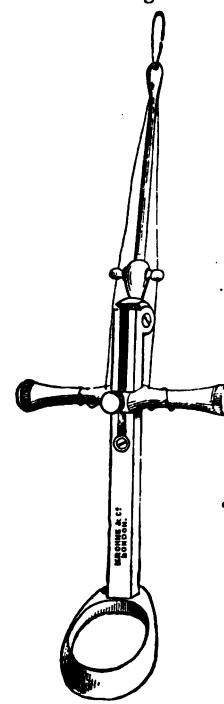
Often free syringing will bring away any loose portions of polypus not removed by the forceps. I have never had any hæmorrhage to speak of after removal of any kind of polypus. I generally use a little alum

Fig. 39.



Polypus Forceps.

Fig. 40.



Durham's Modification of Wilde's Ear and Nose Polypus Snare.

water if the bleeding is severe, and this is usually sufficient to control it. Occasionally it is not possible to remove the entire of one of these vascular polypi at one

time, and we have to operate a few turns before the growth is cleanly extirpated. If the polypus is of larger size, globular or pyriform in shape, of the fibrous, gelatinous, or fibro-gelatinous kind, we must resort to other means of removing the mass. It is well in these cases to determine as carefully as possible before operating, the size, mobility, and seat of attachment of the polypus. This, as a rule, can be readily done with a probe. Most of the globular polypi which fill up the meatus are easily removed, with such a forceps as that figured here (fig. 39); but the best instrument is the polypus snare of Wilde—the only difficulty which we meet with is the careful noosing of the polypus close to its attachment. This, however, is seldom a matter of difficulty, and will be found less so if the wire made for this purpose by Messrs Weiss is employed. This wire will be found quite strong enough for the removal of the polypus, at the same time that it can be easily moulded so as to encircle the mass.

THE USE OF POLITZER'S BAG.

In the Report in the Physiological Section of the Otological Congress, Dr Charles Burnett details some important conclusions which Professor Lucæ has drawn regarding the condition of the pharyngeal orifice of the Eustachian tube during the act of swallowing. Professor Lucæ does not think that during the act of swallowing the tensor palati opens the tube, but he rather inclines to the belief that "this muscle, right after the

completed act of swallowing, participates in the re-opening of the tube, occurring simultaneously with the cessation of the action of the levator palati and the sinking back of the velum." He explains how "the tubal muscles bring about a physiological ventilation of the ear. This ventilation of the ear is not effected, according to this observer, by the opening of the usually closed tube at swallowing, but by the fact that the usually patulous mouth of the quite loosely closed membranous-cartilaginous tube is powerfully compressed by swallowing, and after the act is opened again."

Professor Lucæ has thus found that we may blow air into the middle ear by employing a movement which will cause the velum palati to hermetically close the naso-pharyngeal space. *Such a process may be effected by a prolonged phonation of the vowel a,* which will cause the velum to rise, cut off the upper from the lower pharynx, and during this act air may be blown into the nares, and thence into the middle ear, by a powerful inflation with the hand-balloon." I have tried this experiment several times, and find that the ear is easily inflated during this act, and in a much simpler manner than by the old process of swallowing water.

CHAPTER X.

AFFECTIONS OF THE EXTERNAL MEATUS AND TYMPANUM.

FREE syringing generally is all that is required for the removal of this common and troublesome cause of deafness. Often the mass does not come away until a considerable time is spent in syringing. But it will always ultimately yield. After a portion has been removed, and when the grub of cerumen or waxy cast of the meatus is washed out, the canal should be examined with a speculum; much harm may be done if this step be not attended to, the healthy membrane may be forcibly syringed and much mischief accrue. On the removal of cerumen, the membrane is generally seen, dull, with an absence of transparency, and the surface of the malleus has an inflamed appearance; the collection being removed, an interval of a few days will generally set things to rights, and if this be the sole cause of the symptoms, nothing further is necessary. If any tinnitus or pain persists, or if the deafness is not relieved, we must suspect other mischief, and proceed to examine the ear closely. The usual complaint made by patients suffering from "wax in the ear" is, a deafness, with a stupid feel and some form of tinnitus; I generally Politzerise a patient after removal of wax. I may here say that most ridiculous errors are often committed from the non-recognition of this simple cause of deafness. Nothing can be more exasperating than for a patient to

return a long distance to a surgeon, and find that the source of all his blistering and leeching, and perhaps physicking, lay in a mass of easily removable wax; yet this often occurs. The characteristic black shining surface of the wax can hardly be mistaken, with any degree of care. At times the surface has a peculiar lustre, which causes it to look like the membrane; but it is only necessary to mention this, in order to prevent any surgeon from falling into so unfortunate an error. Two imprudent practices may be referred to in connection with this matter First, the habit of inserting picks, rolls of towels, &c., into the ear, to cleanse the meatus. This can only do harm, and ensures the consolidation of any cerumen in the canal, and its impaction on the drum. Secondly, the fashion of placing cotton wool in the ears, It will be sufficient to mention that not long since I removed three layers of wax and two of cotton wool from the ear of a gentleman who was completely oblivious of the presence of the wool.

Abscess in the Meatus.

Furuncles and abscesses in the external meatus, occurring either as the result of exposure to cold, damp, or the presence of a foreign body, accumulation of wax, &c., are very common. They occur in persons of all types of constitution, often in the midst of robust health, and at all ages. The symptoms are characteristic —severe pain of a shooting nature, increased at night, with some slight attendant fever and constitutional disturbance. This pain is of a radiating character, extending to the side of the head, and aggravated often by movement of the jaw, as in eating. The entire ear

becomes sensitive to the touch, the patient shrinks from examination. The abscess may occupy any portion of the canal, and vary in size from a minute boil situated on some part of its wall, to a considerable swelling which may block up the entire meatus. The intensity of the pain and the symptoms vary according to the situation and extent of the inflammation: whether it be restrained by the bony boundary of the canal and in proximity to the membrane, or seated more externally in the cartilaginous portion. The advent of the attack is frequently marked by a certain amount of tinnitus. The presence of the abscess is easily recognised. It is not often necessary to use any speculum, and this should be avoided, if possible, as its employment causes unnecessary pain. The meatus may be entirely closed by the swelling. This gives rise to a possible source of error, yet one which with any degree of care should never be committed. Quite recently, I found it difficult to persuade a medical man of some experience that such a case was not one of polypus. I have known an instance where an attempt was made to snare an abscess in mistake for a polypus. It is needless to say that with a little care, and if any doubt exists, an examination with a probe, such a mistake could not result; the complete continuity of the abscess with the wall of the meatus immediately distinguishes it. It is rare for the inflammation to resolve itself, and generally in periods varying from two to six or eight days, pus forms and is discharged. The treatment consists in depletion with leeches (two or four) applied over the tragus or in the meatus: in the early stage of the disease warm fomentations, decoctions of chamomile and poppies answer well, and steaming the ear. Hinton and Roosa caution against

the use of external poultices, the latter recommending a small conical linseed poultice introduced into the ear. I rely entirely on constant fomentations * with poppy water, and sometimes benefit may be had from a blister applied over the mastoid process, in the early stages. I have often found vesication of great use in allaying the pain. I have applied also with benefit subcutaneous injections of morphia. If the meatus be not blocked up, warm injections of carefully strained poppy water, frequently repeated, will be found grateful. When the abscess has formed, the early evacuation of pus, by an incision carried well into it, is the only treatment, this incision being followed by careful attention to the meatus and membrane. On this latter point it is not possible to speak too strongly. Many are satisfied with the relief they give their patient with the first incision, and do not continue their care of the canal for some days subsequently. The result is frequently occlusion of the passage, with some epithelium and discharge, perhaps recurrent abscess or implication finally of the membrane. I keep the passage well cleansed, using some mild astringent lotion, such as sulphate of zinc, or borate of soda with glycerine, and warm injections for several days. As abscesses are particularly likely to recur, it is well to warn the patient of this tendency, and so avoid the unpleasantness which sometimes arises from impatience at the prolonged nature of the affection. At times abscess in the meatus assumes very formidable proportions. This is particularly so in those cases where there is frequent recurrence of the abscess. I have at present attending me a patient who came with the meatus completely closed with abscesses; on the opening and reopening of these and the subsi-

* *Maw's* aural douche will be found most convenient.

dence of the inflammation, an enormous quantity of cerumen and epithelium came away, the membrane being perforated behind the mass. A gentleman, a little time since, who had suffered for several months with abscess of the meatus, consulted me: the inflammation extended to the mastoid cells and tympanum, periodical attacks of violent pain, redness and swelling of the mastoid and the parts above the auricle supervened, and then a copious discharge of pus took place from the meatus. On and off these attacks were attended with alarming constitutional symptoms—violent headache, coated tongue, exaltation of temperature, rapid pulse, and sleeplessness. On the escape of the pus all these symptoms subsided. I believe that all the mischief in this case arose from the want of a free incision in the first instance, and the imprudent and prolonged use of large poultices.

Exostosis in the Meatus.

These tumours frequently occur without any assignable cause. They may be congenital. I have seen them connected with a gouty history and family. As to treatment, I believe in preserving the patency of the chink, careful syringing, and the topical application of agents calculated to reduce the congestion of the membrane lining the canal. Electrolysis has been tried with success (Clark). A drill, similar to that used by dentists, has been employed to bore through the exostosis, and sea tangle subsequently employed to dilate the passage.*

* Since writing the above, Mr Lennox Browne has reported in the "British Medical Journal" (Dec. 22, 1877), a successful case of exostosis treated by the dentist's drill, and subsequent avulsion of the exostosis. See also case reported at the Otological Congress by Dr Matthewson of Brooklyn.

Of the agents I have found most useful in exostosis, I may mention especially nitrate of silver, chromic acid and chloride of zinc, syringing with alkaline solutions, injections of iodide of potassium, or hydrochlorate of ammonia. The aural probe is most useful for cleansing the chink and applying solutions. A camel's hair pencil, cut so as to leave only a few of the central hairs, answers admirably for the patient to use himself. Whatever means be adopted, *the great secret is to ensure perfect cleanliness, and to prevent, if possible, complete closing of the canal.* I have given largely to patients affected with exostosis iodide of potassium, but I cannot speak very favourably of the results.

Foreign Bodies in the Meatus.

"I believe," says Hinton in his last work on "Aural Surgery," "it may be laid down as a rule that whenever an instrument will succeed, syringing would also succeed, and that when proper syringing will not succeed, all instruments are full of danger."* I would wish to epitomise all that I could write on this important matter into this one expression of opinion coming from one so experienced. It is here truly that "meddling" does real harm. My remarks must necessarily be brief. I have seen a great many instruments devised to remove

* "Graver and more serious frequently prove those contused and lacerated wounds of the meatus inflicted by a professional hand in attempting the removal of foreign bodies. . . . On such occasions the *instrumental* foreign bodies are generally the chief part of the evil."—*Tröltsch.* There can be no doubt that foreign bodies may remain a long time in the meatus, and produce no bad results. We should remember this fact in cases where patience is indicated, and where there is no need for active and it may be dangerous interference.

foreign bodies. I have read a great many pages devoted to the consideration of the subject; I have heard a good many opinions as to the superiority of this or that method of removal; my belief is, from several years' experience, that syringing is *the* one safe and certain method of removing foreign bodies from the ear. This is *the rule;* there may be some few and rare exceptions. I have, by careful, repeated, well-directed syringing, removed foreign bodies of all descriptions and shapes from the meatus by syringing alone. Only on a few occasions have I ever succeeded in removing a foreign body after failure by syringing, and I feel confident that, had I the opportunity of giving to the syringe a fair trial, I would have found it equally successful. Let me enumerate some of the substances I have thus removed: glass beads of all shapes, shells, stones, pieces of chalk, berries, ears of corn, pieces of slate pencil, &c. I could fill pages with the history of cases of foreign bodies in which by syringing alone I have got rid of the troublesome inmate of the meatus. Lately, after frequent efforts had been made with the syringe for some weeks, I got away with a double loop of silver wire and a Wilde's snare, a conical glass bead, which was fixed in the meatus of a child sent a long distance to me. But if my experience of the syringe in such cases is satisfactory, my opinion of the mischief often unwittingly inflicted with extracting instruments is equally strong. I have seen children and adults in which the membrane and ossicles have been pulled and torn in mistake for a foreign body. Frequently have I seen considerable inflammation excited by such attempts. I am not afraid to wait. I recently had a case in which

after the lapse of a month a foreign body, a stone, came away, which receded each time I attempted to touch it, and the only mischief was a slight catarrhal discharge. In conclusion, on this much debated question of the extraction of foreign bodies from the ear, I venture to give it as my opinion, that *all* instruments are in a degree dangerous, to be employed with caution, and on no account should their use be continued until proper syringing has first been given a long trial. To syringe the ear, the lobe should be held well back, the head sideways, the face slightly up, and the stream directed with sufficient force so as to pass between the foreign body and the wall of the meatus. I fill the ear with glycerine after each syringing, and repeat the process daily. I have known a piece of cobbler's wax used with success to draw a foreign body out. Glue applied with a camel's hair pencil (Lowenberg) and allowed to harden on the body has been employed. Dentist's cement may be tried with the same object. Quietness and firmness with friends, patience in using the syringe, extreme caution with all forms of mechanical helps, are the essentials for dealing successfully with foreign bodies in the ear.

Inflammation of the Membrana Tympani.

In these cases the pain is often most intense, and increases with alarming rapidity, the inflammation running on in a few days to ulceration, when perforation of the membrane results. Inflammation of the membrane is, as a rule, accompanied with a certain degree of inflammation of the meatus, the entire ear becomes exquisitely sensitive, and the pain extends to the corresponding side of the head and face. Relief is sometimes

experienced when the perforation occurs. The throat is constantly affected, and consequently the Eustachian tube. The treatment is simple. In the early stages free depletion by leeches (the artificial leech, if it can be had), warm fomentations, vesication over the mastoid; constant warm douchings applied through the meatus; attention to the throat, both by means of the syphon douche, and also by topical applications by means of a brush; and in certain cases where the membrane is seen bulging and secretions are accumulated on the tympanum, free incision of the membrane. This last mode of treatment is unquestionably indicated in those instances of inflammation which occur in scarlatina and during the exanthemata. It is now widely recognised as the proper step to take when the ear is threatened in these affections. Subsequently to the subsidence of the acute symptoms, close attention must be directed to the condition of the Eustachian tube and the cavity of the tympanum, through cleansing of the meatus and membrane, the use of Politzer's bag, and if necessary the washing out of the tympanic cavity with warm alkaline solutions (muriate of ammonia or iodide of potassium), 2 grains to 5 grains to the ounce. At the same time the general health must be restored by change of air, tonics, cod-liver oil, and iron with quinine.

Polypi.

Fibro-gelatinous polypi of the ordinary kind are recognised; in some cases they are concealed by discharge and epithelium, on the removal of which with a syringe the polypus comes into view. There is frequently a sense of pain during their formation, and the

characteristic symptoms are deafness with discharge, occasionally mingled with blood. These polypi are easily removed with a small forceps, a miniature vulcellum, or Wilde's snare. They may grow from the meatus, just in front of the membrane, and perhaps conceal a perforation of the latter.

A small fibroid polypus may grow from the membrane itself. This, however, is rare. In any case, the principal symptoms complained of are, discharge, bleeding, tinnitus, and deafness. Mr Lennox Brown exhibited this year, at the annual meeting of the British Medical Association, a most ingenious form of the galvano-cautery for removal of aural and nasal polypi: it is worked by the foot. It may be had of Messrs Mayer and Meltzer.

Vascular Polypi.

I group under this heading those small vascular growths which are so characteristic of a type of polypus which springs from the tympanum or the membrane. There is as a rule always perforation, though it is frequently concealed by the polypus.

For operating on these growths, I use either the rectangular ring forceps, or the lever ring forceps of Toynbee. This latter instrument is admirably adapted for this purpose. But removal of these troublesome growths is only the first step in the process of cure. It requires often considerable forbearance on the part both of the patient and surgeon to follow up this treatment. Daily touching of the exposed surface with some caustic is required, as well as thorough cleansing out of the canal; having wiped the raw surface with cotton wool, used

with the aural probe, then the site of the polypus must be touched with a fine pencil of wool rolled on the point of the probe, and moistened with chloro-acetic acid. I also use nitrate of silver, carbolic acid, chromic acid, and alcohol with glycerine. But after a fair trial of many agents, I prefer the chloro-acetic acid to any for this purpose. One rule should be adopted in every case; no one should be satisfied as to the cure of the disease until all discharge has ceased, any superfluous cakes of epithelium are removed, and the surface from which the polypus springs presents a healthy appearance.

In Mr Dalby's valuable *brochure* on "Aural Diseases, will be found a complete description of the microscopical appearances of aural polypi. I must refer the reader to this work for a full histological account of these growths. The usual large polypi appear to be chiefly composed of fibrous tissue with varying proportions of cell elements. In the description given by Mr Whipham, of one of the softer varieties of polypus examined by him "of a gelatinous semi-transparent appearance and very soft," he depicts it as consisting of a fibrillated interlacing stroma, which in some cases was extremely delicate, while in others it was of a coarse texture. In the meshes were found, here and there, round cells thinly scattered; and in other parts, the branching anastomosing cells characteristic of myxoma. He points out that the reticulum was finer, and the meshes smaller than in ordinary myxoma, approaching more nearly, save for the absence of lymph cells, lymphadenoma. "The tumour was bounded by a capsular layer of epithelium cells." In another specimen examined, the nature of the growth was that of round-celled sarcoma. Mr Dalby says that

in his experience the lining membrane of the tympanum is "the most frequent seat from which polypi spring, next in frequency the meatus, and then the tympanic membrane." This accords with my own experience.

Mucus in the Tympanum.

We have considered briefly the effects of closure of the Eustachian tube and catarrh of the tympanum. One of the most frequent of these is the accumulation of mucus in the tympanum. A patient presents himself with a history of a recent cold, or it may have been a throat attack, and this has been succeeded by a deafness of generally one ear. On testing the hearing with the tuning-fork, we find that it is heard loudest in the affected ear, and that there is no marked difference on closing the meatus of this ear; that is, the tuning-fork is not then heard louder. There is frequently tinnitus. There is, at times, conveyed a moist or gurgling sound with the otoscope. The membrane has perhaps lost its transparent look; it is either concave and white, or at times it is bulging forwards. We may at once suspect a recent accumulation of mucus in the tympanum. But we more frequently, perhaps, meet chronic cases in which no treatment has been pursued, or, if any, some useless, empirical course of blistering and leeching, which has been energetically pushed, with a pleasing variation in the administration of remedies internally, while the tympanum has been all the time gradually filling with dry mucus, hardening and producing, it may be, irremediable changes. As to the appearance of the membrane in cases of accumulated mucus, I must confess that in my experience there is no one form characteristic of this

condition. It may bulge in a part, or appear as if the entire membrane bulged outwards; or, on the other hand, it may appear abnormally concave, and this bulging or concavity may be accompanied by every variety of change in the position and shape of the membrane, and irregularity in the position of the malleus. These alterations in the form of the membrane do not, as a rule, bear any definite relationship to the degree of deafness or the tinnitus. The membrane may appear but slightly changed, and yet the deafness and tinnitus be extreme. There can be no doubt that impairment of the nerve frequently attends on the presence of mucus in the tympanum. This I have on many occasions noticed. Severe mental shock, the occurrence of a fever with brain complications, may have produced the nervous derangement, while an accompanying relaxed state of the throat has left imprisoned secretions in the tympanum. So, in other cases, a gouty or syphilitic taint has often been the source both of the nervous derangement and of the accumulated mucus. It is often unquestionably very difficult to diagnose positively the presence of mucus in the tympanum, especially in old chronic cases complicated with other lesions, whether of the nerve, ossicles, or membrane. In such cases the operation of paracentesis must be purely experimental, and may be, and often is, followed by negative results. Yet in many instances where we do not succeed in obtaining any proof of the accumulation by evacuating the mucus, still we have the satisfaction of seeing our patient benefited by the treatment, and the hearing decidedly improved. Not long ago I had a patient who came to me extremely deaf, not hearing the watch when

pressed to the ear, and whose conversational hearing power was very bad. There was an old syphilitic history. The tuning-fork was well heard, but closure of the meatus produced no difference, the membrane had a bulged appearance, and the sound with the otoscope was of a gurgling character. I determined to incise, and accordingly, after some previous syringing with warm iodide of potassium, punctured both membranes and kept the apertures free. I succeeded in getting a quantity of semi-transparent mucus of a brownish colour through both openings. This man, with his face everted, subsequently heard me conversing in a low tone across my study. I have just such another case attending me at the present moment, in which the previous warm syringing of iodide of potassium solution, through the tympanum, preparatory to puncture, has produced considerable benefit.* The treatment of accumulated mucus must to a great extent depend on the duration of the affection. If recent, and that the accumulation has not gone to a great extent, we can do much by warm alkaline injections (two to five grains to the ounce) of carbonate of soda, iodide of potassium, common salt, chloride of ammonium, &c., into the tympanum; also by injection of sulphate of zinc (two to five grains to the ounce), or the passage of iodine vapour. Such means, combined with the free use of the air douche and the nasal syphon douche, or the sniffing up of tepid salt and water out of a saucer into the nostrils, often afford complete relief. For the nervine complication at times present in these cases, perchloride

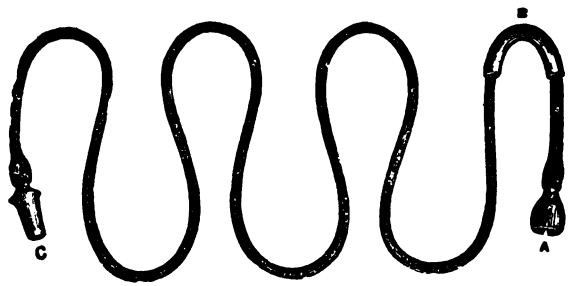
* Perforation of the membrane has, in the case alluded to, been followed by a marked and still further improvement.

of iron, with strychnia, where there is general debility, is *the* most valuable combination. At times, in hysterical patients and delicate women, bromide of potassium, or bromide of ammonium with iron, I find most useful. For the tinnitus, the internal use of bromide of potassium and *hydrobromic acid* may be tried. *Nitrite of amyl* I have found useful in some instances of troublesome tinnitus, but it has often failed. Iodide of potassium in gouty and syphilitic systems, and also bichloride of mercury in the latter, are of service. Thorough cleaning out of the Eustachian tube and tympanum, combined with such internal remedies as give tone to the system, at the same time that we keep the secretions regular (with Freidrichshall and Hunyadi Janos water), is the summary of the treatment of mucus accumulation in the tympanum. Then the question of artificial perforation remains. I have elsewhere alluded to this operation and the mode of performing it. Whatever doubt may remain as to the propriety of this step as an experimental effort in obscure cases of deafness, combined at times with division of the tensor tympani, to afford relief, especially in troublesome tinnitus, none can exist as to its utility, where accumulated mucus is the cause of the trouble, or in those acute cases, before referred to, which are so ambiguously grouped under the heading of "acute aural catarrh."

The nasal douche is an admirable method of applying a saline solution, such as that of common salt, to the naso-pharyngeal tract. Also mildly medicated lotions can in this way be employed for disinfective purposes, such as weak carbolised solution, Condy's, or chlorinated soda. But it requires caution in its use. Frequently

patients have come complaining of the effects, in producing uncomfortable giddiness, headache, faintness, innitus, &c., these results taking place even when the douche was used with every care and precaution possible. Others can hear it with impunity. I have never had a further bad result from the nasal douche than those here stated; but I have always discontinued it when I got those indications of mischief. I have had no unpleasant sequences from the snuffing-up of the salt

Fig. 41.

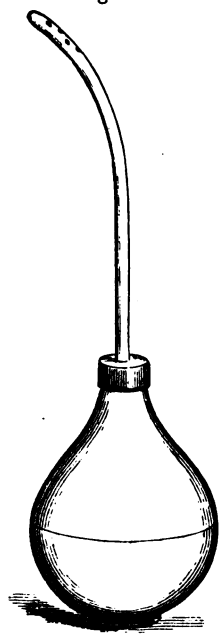


Syphon Douche.

water from a saucer. Therefore, in those cases where the syphon douche cannot be taken advantage of, I trust to this plan, and the free application of the ordinary laryngeal brush to the orifices of the Eustachian tubes, passing it well up behind the soft palate, the tongue being drawn forward with a napkin. The Eustachian forceps of Turnbull answers the purpose admirably, or the nasal douche shown at fig. 41, which can be used by the patient. In giving instructions for the employment of the syphon tube, the patient should be told to bend the head slightly forwards, inserting the

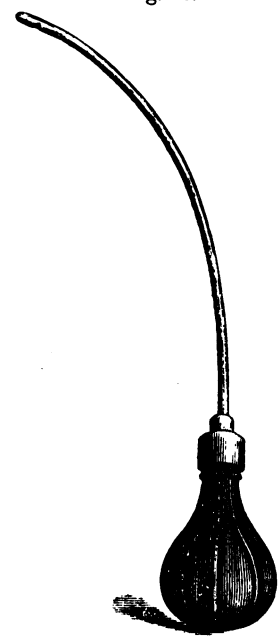
nose-piece (*c*) in one nostril, the stream running out through the other.* The vessel containing the fluid should not be more than a foot above the patient's head, the water

Fig. 42.



Nasal Douche for the posterior nares (soft pewter pipe).

Fig. 43.



Small Nasal Douche (Weiss) (soft elastic pipe).

must be of the body temperature, and while the stream is passing the patient must not swallow, but keep the mouth partly open.

* The syphon douche, fig. 41, has been made for me by Messrs Arnold. The parts *a*, *b*, *c* are made of vulcanite. If the nose-piece does not fit comfortably, a small portion of india-rubber tubing can be placed over it.

The hand douches (figs. 42, 43) are indispensable in the treatment of post-nasal catarrh and ozœnatous states.

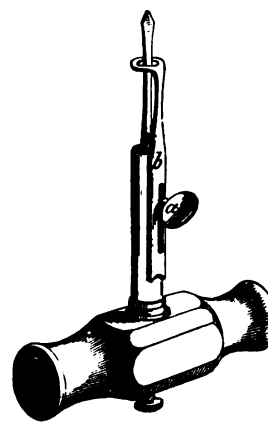
Brain Complications in Cases of Acute or Chronic Catarrh of the Tympanum.—A little girl was attending the hospital with aural catarrh. She came with the meatus considerably contracted, and there was great difficulty in introducing the smallest speculum; however, after a few days, by careful cleansing and syringing, I was enabled to see the membrane.* I determined, on seeing its bulged-out and inflamed look, to puncture, and expressed my anxiety as to the danger of some secretion being retained in the tympanum. The child was to have been operated on the following day, but the friends neglected to bring her. I afterwards learned that she died comatose with convulsions. This was just one of those cases where close attention to the ear and incision of the membrane might have saved life. In children especially, this brain mischief is apt to creep on unperceived. The rapidity with which cerebral complications make their appearance in the midst of perfect health, in cases of long-standing ear disease, should always be borne in mind. Increase of pain and deafness with constitutional symptoms, such as rigors, high temperature, furred tongue, rapid pulse, mark the outset of the mischief, and as perhaps the discharge from the ear has ceased, attention is diverted from this organ. But often, notwithstanding every effort, the patient rapidly succumbs. The pain increases in the ear, and radiates over the entire head. The pulse falls, the bowel is costive; obstinate vomiting may ensue. The

* This membrane is represented in the *Atlas*.

mind generally remains clear, but finally the patient sinks comatose or convulsed.

A few years since I lost a valued friend with just such a train of symptoms as those above-mentioned. He had been a patient of Mr Toynbee's, and had occasional discharge from the ear, and a large perforation which was never properly healed. This discharge broke out occasionally, and caused him great annoyance. Sud-

Fig. 44.



Hinton's Trephine.

denly, before the fatal attack, it ceased. He was seized with violent pain, and he died in a few days comatose.

I am aware of three cases in which death by pyæmia from implication of the lateral sinus occurred. In treating such cases there must be no delay or tampering. Prompt and energetic action is required, thorough exploration of the meatus, removal of all discharge and any polypus, if present, instantly removed, repeated

fomentations, the application of leeches, free incision of the membrane if we suspect pent-up secretion, and the same over the mastoid process, or the use of the trephine if there be any bulging of the inflamed part, from which we may suspect the presence of purulent matter in the mastoid cells. On these occasions I have seen life saved by a free incision made down to the mastoid process, this incision being followed by the escape of pus and dead bone.

To trephine the *mastoid process* it is necessary to have a guarded trephine. I have used the instrument (fig. 44, p. 119) with satisfaction on a few occasions. The guard (*b*) is regulated by a screw (*a*), and the depth to which we desire to pass the blade is thus limited. It is the aural trephine, used by Mr Hinton.

Perforation of the Membrana Tympani.

It is not possible, keeping within the scope of this work, to do more than allude very generally to the important class of diseases of the ear which terminate in perforation. Tröltsch classifies aural catarrh under these heads; simple acute and simple chronic, subdivided into dry and moist; acute suppurative catarrh, chronic suppurative aural catarrh, or chronic otitis media. On inquiry we find that all these abnormal states are but various degrees of inflammatory action occurring in the tympanic cavity or the passages. The inflammation may be acute, and not pass into the purulent form. The secretion is increased, but preserves its mucoid nature, mucus becomes accumulated in the tympanum, and if it is not allowed a means of exit by

paracentesis of the membrane, this accumulation leads to a chronic catarrhal condition of the tympanum in which the bones and lining membrane become affected. This is *simple catarrh*, and seldom causes perforation. "*Acute suppurative catarrh*" is a very different disease; we have it typically represented in the attack which accompanies or follows scarlatina or typhus fever. Here we have severe constitutional symptoms, pain, tinnitus, deafness, and discharge of pus from the meatus. Perforation of the membrane occurs in periods varying according to the severity of the attack. It is in the neglect of the warning afforded by the aural mischief, the attention of the medical man being diverted by secondary brain complications, when in reality the trouble is purely aural, that the surgeon is so apt to commit an error. Irreparable deafness—perhaps mutism—is the consequence. Paracentesis of the membrane is *the* remedy. In "*chronic suppurative catarrh*," we recognise that frequent source of perforation which is so commonly presented to us in hospital practice. The patient comes, complaining of deafness and discharge; there may or may not have been attendant pain. When we inquire into the cause, especially in children, we find that it is not easily ascertained. It may be attributed to cold, or some feverish attack, or have supervened on some one of the exanthemata. Its origin may have been a foreign body or an injury. On examining the ear there is often a quantity of yellowish discharge concealing the membrane from view, and this is chiefly pus mixed with epithelium. On washing this well out, we see the membrane in varying degrees of thickness and shades of colour, most frequently perforated. These perforations are often

large, and not uncommonly a polypus is detected growing from the tympanum through the perforation, or projecting from it. On examining the throat in these cases we may find an explanation of the ear trouble. Catarrhal states of the nasal and pharyngeal mucous membranes, enlarged tonsils, are conditions which accompany Eustachian obstruction or closure. A perforation, unless it present the form of a mere rent in the membrane, or a minute pinhole, is easily seen, and if not seen, is discovered by means of the otoscope. A source of error to beginners is the bright bubble of air and liquid which sometimes obscures the orifice. On throwing a good light on the membrane, and desiring the patient to close the nose and blow, the air will be seen to bubble out through the aperture in the membrane. Sometimes these perforations pulsate; this is due to the arterial throb. This pulsation may alarm one not accustomed to examine acute perforations; it is valuable as a diagnostic sign. As to the character of a perforation, this may vary in size from a small pinhole or chink to a large ragged opening. One or all the bones may be destroyed, ankylosed, or attached by adhesions to the tympanic walls. A mere rim of membrane may be all that is left, or even this may be absent. Before passing to the treatment of perforations, there are a few practical points worth noticing. The first is the large number of patients who have extensive perforations yet retain remarkably good hearing power. The greater the number of cases we treat, the more are we astonished at the percentage of patients whose hearing varies, say from $\frac{3}{3}\frac{0}{0}$ to $\frac{1}{6}\frac{8}{0}$ with the watch test, and whose conversational power is excellent. As noticed by Politzer, Wilde, and others, this hearing

power does not appear to depend so much on the size of the perforation as the part implicated. It of course is more particularly influenced by any abnormality of the stapes itself, directly through adhesions, ankylosis, &c., or indirectly through the direction of the perforation (Politzer), and the transmission of the sound-waves to this bone. This is to be remembered in the application of artificial membranes, the good effected being not so much attributable to closure of the opening by the disc or wool, as to properly-applied pressure on the stapes. Hence it may be only after two or three trials that we get the desired result, in applying a membrane for the first time. The second point I wish briefly to notice is —the large number of children who apply for relief for perforation of the membrane. Aural catarrh, acute or chronic, is often shamefully neglected in children; the younger the child, and therefore the less competent to make its complaint known, the greater the probability of neglect. Aural mischief is, in a very young child, often masked by symptoms which direct attention to other parts, the brain, stomach, or the teeth. Discharge from the ear is long neglected, and the ignorance of its cause or the results of its continuance induce many to fancy that to arrest it is a mistake. Therefore it is that in children, where there are obscure head symptoms with feverishness and restlessness, the surgeon should always examine the ear. Discharge continues often for a long time in children with but little effect on the hearing, and no pain. When the ear is seen for the first time there is frequently perforation of the membrane, a granular state of it, or polypus. The present neglect of aural complaints in young children is a fact that cannot be

too strongly animadverted on. Too frequently it happens that the surgeon is asked for advice only when irremediable and fatal brain complications have arisen. If this be on the part of friends culpable, how much more so in the case of the medical adviser, who, through carelessness, has permitted these warnings to pass unheeded, which might, if noticed in time, save life.

To successfully treat any aural case, the surgeon must always remember the cycle of causes which set in motion the actual train of symptoms from which a patient suffers. The disease may have its origin in the throat, and pass to the Eustachian tube, and thence to the tympanum with its ossicles, involving the membrane, and lastly the external meatus; or the reverse of this order may mark the course of the disease. So in perforation. In treating a case all through, we must not merely direct our efforts towards healing the membrane, but we must also attend to all the passages, as for example, any relaxed or congested state of the mucous membrane of the pharynx, enlarged tonsils, and to the naso-pharyngeal mucous membrane. If the throat be engaged, astringent washes, lozenges of kino, guaiacum, chlorate of potash, catechu, plain or effervescing (Throat Hospital Pharmacopœia), douches, or sprays with carbolic acid, or permanganate of potash solutions, &c., are useful. Touching the pharynx and Eustachian tube with solutions of nitrate of silver, chloride of zinc, or perchloride of iron, insufflation of finely powdered guiaicum, through the nares or on the pharynx; these are a few out of the many means which may be resorted to. If the tonsils are much hypertrophied, they should be removed with Mackenzie's tonsil-guillotine. Often

as I have removed the tonsils, I have never had any troublesome bleeding with this instrument, none which a little alum gargling, or the use of perchloride of iron, did not immediately restrain. The suction of ice before and after removal is a precaution I always adopt. If the Eustachian tube is closed or obstructed it must be attended to, catheterised, and washed out with warm alkaline solutions. So also the tympanum, if there be any accumulated secretions; Politzer's air douche is here indispensable. But when we come to deal with the perforation itself, the first essential is perfect cleanliness, by washing out all discharge from the tympanum and meatus. This is best done after cleansing the meatus by passing a stream through the tympanum—the head bent forward and allowing the fluid to run from the nose. In this manner the entire passages are cleansed. I select generally a chloride of zinc solution (gr. ij. to gr. iv. to the ounce), with a little glycerine or carbolic acid. I always first pass a stream of water through, and then the astringent or disinfectant solution. In fact, in all syringing of the ear, warm water should first be used, so as to clear out all old discharge before employing a medicated solution. The healing of the perforation, which is generally a tedious process, is best effected by repeated topical applications of various stimulating and astringent solutions. Talc powder, tannic acid, nitrate of silver, chloride of zinc, sulphate of zinc, alcohol, and glycerine are some of those most frequently used with success. Having cleansed out the meatus and perforation well, the latter should be then thoroughly dried with cotton wool rolled on the aural probe, and then with this same probe the nitrate of

silver or other solution carried well down to the perforation, and its margin touched. If the talc powder be used it must be very gently blown with a fine tube, and quite on to the surface of the membrane, and care must be taken that it is washed out every third day before it is again applied.

I rely chiefly in all these cases on nitrate of silver (ten to twenty grains to the ounce). I find it, after various trials, the most efficacious remedy for healing perforations. Alcohol and glycerine, equal parts of each, I find also most useful for cleansing and hardening the membrane. I know no better lotion for the patient's own use than that of sulphate of zinc and glycerine with carbolic acid. However, these remedies and others must be alternated and varied in the treatment of perforation, the secret of treating them successfully being constant attention and cleanliness on the part of the patient, combined with the application, almost daily by the surgeon himself, of the more powerful remedies.

In the acute stages preceding the perforation, every means should be adopted to arrest the force of the inflammation, and to relieve pain; such as leeches, warm fomentations (never poultices), gentle warm washings-out of the meatus, attention to the throat, and, I am old-fashioned enough to recommend in many cases, vesication over the mastoid. When discharge does accumulate, it should be gently and carefully removed. If paracentesis is indicated the operation should be performed without delay.

With reference to the application of artificial membranes, I have previously described the different forms of these, and the best mode of their application. I

seldom, lately, resort to the membrane; I frequently use the plain cotton wool. In some instances there is marked improvement, but I must say that in my experience, in a large percentage of perforation cases, that improvement is not sufficient to compensate for the inconvenience and slight risk which attends the use of the artificial membrane. This is particularly so in the poorer classes of society, where neglect of the artificial membrane is often found to be followed by bad results. I prefer in such patients to get the membrane and perforation into as healthy a state as possible, enforcing on them a periodical visit, and unless they are very intelligent, I do not trust them with an artificial membrane. This I give as my experience and practice, but every one can try the artificial membrane for himself, adopting such precautions as I have already laid down. The feelings of his patient, and the success of the experiment, are the best tests which he can have of its utility in any individual case.

Hereditary Syphilitic Deafness.

I have already referred to the large number of cases of deafness which are due to inherited syphilis. I have also briefly alluded to the other characteristics which enable us to detect the syphilitic taint. I have remarked that in many of the patients there is no abnormal appearance of the membrane which can be looked on as pathognomonic. In several others I have seen the membrane dull and thickened, it has lost its transparency, is rather of a grey colour, and inflates with a dry click. I believe, however, that it is *impossible* to define any typical appearance in this affection, in which

I regret to say that treatment has with me proved of little avail. If taken in the early stages, or when the symptoms first manifest themselves, much may be done by mercurial treatment (inunction), followed by iodide of potassium internally, at the same time that the Eustachian tube is attended to and the tympanum kept free by warm iodide of potassium injections. But when a case comes with extreme deafness (both with the watch and tuning-fork), and presents the characteristic teeth of Hutchinson, and the proofs of an attack of interstitial keratitis, either remote or recent, I do not hope for a good result from *any treatment.*

Cretaceous Deposits on the Membrane.

These deposits occur occasionally, and are easily recognised. They appear as white layers of chalky substance on the membrane, which is generally also altered in shape, perhaps adherent to the tympanum. They may exist without much disturbance of hearing, and frequently are to be found in one ear only. A lad of 18, whose hearing in the left ear was normal, consulted me for obstinate deafness in the right ear. The two pockets were covered with irregular shaped white masses of a chalky substance. The tuning-fork was heard less loud in this ear, and inflation of the membrane was attended with a dry sound. I did not interfere. A drawing of this case, and others of the same nature, I have included amongst those I have selected for the Atlas. An officer consulted me for constant tinnitus in the right ear. The deafness had lasted for ten years; it was rather worse of late; he had been twelve years in India; the tinnitus commenced after his return home, and

the deafness grew worse. There never had been pain; there was no family history of deafness. The watch was not heard on contact. The membrane had a cretaceous mass in the superior pocket, and on inflation there was a dry and grating sound. The tuning-fork was heard only in the left ear, whether placed on the head or the teeth. He suffered from giddiness at times, and tendency to fall. When the secretions were irregular, or that he was "bilious," the tinnitus, he said, became much worse. Nothing relieved him. Hydrobromic acid and bromide of potassium cured the giddiness, but the tinnitus yielded to no treatment. Hinton, in his remarks on the climate of India, notices the susceptibility of residents of that country to the influence of quinine. In these persons, he says, "loss of hearing without visible affection of the tympanum is very frequent." So also he notices the tinnitus, which at times gets worse on return to England, as in the above case (the skin not acting), and remarks that children born in India, "who have lived there during their first years, seem subject to become deaf with no visible cause as they approach the age of puberty." I have myself been consulted by several officers who have returned from India with incurable deafness and tinnitus. In nearly all the cases there were evidences of old catarrh in the tympanum, and changes in the membrane and ossicles.

CHAPTER XI.

EUSTACHIAN OBSTRUCTION AND CLOSURE.

If we were to study all the various diseases of the ear, which follow abnormal conditions of the Eustachian tube, we would find that this passage, its healthy or unhealthy state, offers to us a clue to the causes of, by far the largest proportion of aural complaints.

I must therefore be satisfied here with dealing briefly, but practically, with some of the diseased conditions of the Eustachian tube. The original causes of Eustachian closure may be simply cold "caught" in any way; exposure to draughts, damp, rheumatism, sea-bathing, exanthemata, heavy mental shocks, &c., are some of the most frequently assigned causes. During a cold, every one is familiar with the sense of stuffing in the ears, and perhaps muffling of sounds or tinnitus which accompanies it. On examining the throat, we may find the mucus membrane swollen or turgid; perhaps the uvula is enlarged, or the tonsils are hypertrophied. The faucial orifice of the Eustachian tube is likewise swollen; and in consequence there is temporary closure of the passage, and mucus is imprisoned in it. It is when this condition persists for a little time that we see the characteristic membrane of Eustachian closure. Little air enters the tube, and a partial vacuum is formed in the tympanum, which results in an increased concavity of the membrane.

Hinton says this form of membrane is characteristic of Eustachian deafness.* "The malleus appears foreshortened, and the membrane has a tense stretched look, like a drawn curtain, often falling into similar folds. The colour varies, is generally white and dull, but sometimes, especially in the earlier stages, the congested mucous membrane of the tympanum shines through it." When inflation is resorted to, we hear the sound with the otoscope either not at all, or with great difficulty. Now this simple swelling of the Eustachian tube, which at first may be periodical and remittent, may finally become chronic and permanent, beginning with a slight deafness, and perhaps a little ear-ache; it may or may not be a considerable time, dependant to a certain extent, whether the mischief appertains to one or both ears, before troublesome deafness, accompanied with tinnitus, occurs. Nothing in the whole range of medical practice is more astonishing than the extent to which persons permit aural mischief to proceed before they seek relief. This is the more remarkable if only one ear be affected; often it is the incessant noise in the ears which forces them to apply, and not the deafness. If the closure and obstruction lead to other results, say acute inflammation (catarrh) of the tympanum, and perforation of the membrane, as it frequently does, then they apply for relief of the pain and other symptoms which accompany it. If it does pass into this chronically contracted or permanently closed state the most serious results follow.

The slight catarrhal inflammation, which is the consequence of the primary affection, leads to an accumulation of mucus. This mucus increases in quantity and is

* See page 134, Löwenberg's view.

imprisoned. It may become hardened and form hard masses both in the tube and the cavity of the tympanum, about the chain of ossicles, and on the membrane. A collapsed and closed Eustachian tube, leading to imprisonment of mucus, abnormal concavity of the membrana tympani, followed later on by alteration in the shape and appearance of the latter, adhesions, ankylosis of the ossicles and hardening of the mucus, are the usual effects which ensue on a common cause, viz., a catarrhal state of the nasopharyngeal mucous tract.

In the treatment of all conditions supervening on a closed or obstinate state of the Eustachian tube, the first matter is to secure its patency. The method of doing this I have already dwelt on. Catheterisation, assisted if necessary by ordinary or laminaria bougies (very fine) about half a line in diameter for the narrowest part of Eustachian (Hinton). If a laminaria bougie is used in addition to the catheter, it must not be left in longer than twenty minutes. The bougie is passed through the catheter, which is put in first, and the catheter is withdrawn before the bougie. I seldom now use any bougies. Various sizes of the latter may be introduced through the catheter, which then can be withdrawn with the bougie, and so we may prevent its being broken in the passage. I have never had a case of a foreign body (except snuff) blocking up the tube. I rely in most cases of Eustachian closure mainly on warm iodide of potassium injection, and frequent use of Politzer's bag. The nasal douche of salt water, previously alluded to, is often of great benefit. But constantly we meet patients who cannot use the syphon douche. Then the simple sniffing up of a warm solu-

tion of salt is a capital substitute. I generally direct about an egg-spoonful to two wine-glasses of tepid water, used once daily. If acute perforation occurs from closure of the Eustachian tube, we must be satisfied with gentle washing out of the tympanum daily with a warm solution of chloride of ammonium, while we attend to the inflammatory condition of the membrane by warm fomentation, gentle syringing with anodyne and alkaline washes, leeches, or vesication. I exhibited recently, at the meeting of the British Medical Association, a collection of water-colour drawings of the different diseased conditions of the membrana tympani, accurately taken from nature at the Ophthalmic and Aural Hospital. Amongst these was one typical of a class of membrane frequently found as the result of closure of the Eustachian tube, and accompanying this condition. The membrane had that characteristically thin appearance seen in complete collapse. On inflation, the lower portion of the membrane was blown bladder-like out. The upper part and malleus were bound by adhesion down to the inner wall of the tympanum. Hinton graphically describes this state under the head of "Collapse and Rigidity of the Membrane," and he notices the fact, illustrated in the above-mentioned case, that the hearing power is often good. He advises, when the membrane lies in contact with the tympanic wall, the application of the artificial membrane. Suction of the meatus, as recommended by him, I have frequently found of service in these collapsed conditions of the Eustachian tube. This is best effected with the pneumatic speculum, through which we can at the same time see the adhesion and the extent to which

the membrane and malleus are adherent. But it is a good plan to give a patient a piece of tubing with a quill inserted in one end to fit the meatus, and instruct him to apply suction with the mouth through the other. This plan of suction and inflation practised by the patient himself may be followed up by incision of the membrane, or, in rare instances (Hinton), an attempt may be made to restore the malleus to a normal position, as by doing so we free the stapes. This, however, is a step not to be lightly undertaken, as it requires the most delicate manipulation to cut round the adherent malleus or stapes, and raise them by the gentlest of pressure into a better position. Politzer's plan of "air-tight closure" of the malleus when the membrane has been well inflated, may be found useful in these cases of collapsed membrane. A piece of cotton wool is rolled into a ball with some cord or softened wax, and after a powerful inflation of the membrane, the meatus is plugged with the ball. This the patient can do himself, wearing the ball at night, and periodically omitting it.

Dr Löwenberg, in a paper reported in the "International Otological Society's Proceedings, 1876," combats the usual view of the gradual absorption of air in the tympanum, supposed to take place as a consequence of closed Eustachian tube. From a study of the physico-physiological functions of the lungs, and the changes undergone by the gases of the atmosphere, and those of the blood contained in the vessels of the air-cells, he was led to attribute a somewhat similar gaseous interchange between the air contained in and entering the tympanum and the blood circulating in its vessels. He "puts the change taking place in an artificially-shut

bronchus in a parallel with the one happening in the tympanic cavities with intercepted Eustachian tube." The absorbed oxygen is replaced by carbonic acid, and this leads to "a defect in the remaining total sum of gas," and this diminution accounts for the sinking inward of the membrane, which is followed by the well-known consequences of Eustachian obstruction. With a view to substitute a gaseous compound which will not suffer diminution in the tympanum, being as near as possible in its nature to the mixture which results from a previous interchange, and which must necessarily behave quite differently towards the blood in the tympanum from the unaltered air, he inflates periodically previously respired air, composed of nitrogen, a large quantity of carbonic acid, and very little oxygen, warmed to the body temperature and saturated with watery vapour. A very deep inspiration, the breath being kept as long as possible, and then a strong expiration, gives the requisite compound. But to obtain a certainty of interchange, he "submits the same quantity of air to several alternate inspirations and expirations." The patient "is made to breathe into a bag made of thin rubber, or a bladder, provided with a cock, to which he adapts a piece of rubber tubing; the free end of the latter is introduced into the mouth of the patient, who shuts his nose with the fingers, and inspires and expires alternately from and into the bag." This air so obtained is inflated, either by Politzer's method, or through the catheter, or by aspirating the bag, with an ordinary Politzer's bag, by compressing this latter directly from the bag, and introducing its nozzle into the tubing, opening the cock, and filling the bag with the respired

air, which can thus be inflated several times in succession. Acting on the knowledge that hydrogen gas is not absorbed in the lung (Regnault and Reiset), Dr Löwenberg substituted hydrogen gas for recently prepared air in inflation. He remarks on the benefit derived from these mixtures. I have been trying respired air for some time by means of an ordinary Politzer's bag with a stop-cock and piece of tubing, and my experience of its use induces me to continue to employ it in cases in which the effect is transitory with the ordinary air inflation.*

The Mastoid Cells.

In various catarrhal states of the meatus and tympanum, the inflammation may spread to the mastoid cells and to the brain. The cerebrum and cerebellum may be attacked, more frequently the latter, if the case be that of an adult. There are many cases which give rise to inflammation and abscess of the mastoid process. The exanthemata, injury, abscesses in the meatus, catarrh in the tympanum, polypi, scrofulous inflammation, all may, both in children and adults, lead to abscess in the mastoid or mastoid periostitis. The periostitis which accompanies these catarrhal states of the meatus, and which at times occurs independently of them, is marked by characteristic symptoms. There are frequently severe constitutional accompaniments, such as rigor, rapid coating of the tongue, quick pulse, increase of temperature, with severe pain. The post-auricular and supra-auricular regions become red and

* The bag, with stop-cock, can be had from Messrs Matthews, London.

swollen. The rapidity with which the swelling occurs is often alarming. In a case I had of severe furunculous inflammation in the meatus, the entire side of the face and neck became swollen in forty-eight hours. The swelling has then an erysipelatous look. I have never yet seen a case of mastoid periostitis or abscess where the meatus and tympanum have not been involved. The sterno-mastoid has only been implicated in one case. Turnbull notices that this implication of the sterno-mastoid is not probable when the inflammation is intense. Here we are more likely to have caries and post-aural opening. If the inflammation runs its course, it may cause suppuration, and the pus will find its way out either by the external meatus or through the mastoid process. Bearing in mind the anatomy of the bony parts, it must be a matter for surprise that the mastoid cells escape as frequently as they do, when the tympanum is affected. Still there can be little doubt that this spreading of the inflammation does frequently occur, and often is not suspected. Purulent or hyperplastic formation may take place in the mastoid cells, especially in children, and no external evidence exists of this occurrence. It is surprising how often in children, especially of the poorer classes, extensive bone changes may go on in the mastoid, leading to softening, necrosis, and caries, with but little indication of the danger, and consequently a degree of excusable neglect on the part of the parents. In a short paper on "Hyperostosis of the Mastoid Process," by Dr Green of Boston, and published in the "Proceedings" of the Otological Society (1877) of New York, the author divides the results of periostitis in the interior of the mastoid cells thus:—1. *Formation*

of pus and resulting abscess; 2. *Extension of the inflammation by the minute vessels in the osseous foramina to the external surface of the mastoid;* 3. *Ostitis*—this latter being purulent or hyperplastic—purulent, leading to perforation, with consequent absorption of the entire osseous structure or of the calcareous particles alone, or, it may be, to complete necrosis or caries; hyperplastic, causing new periosteal bony formation, and resulting hyperostosis, and perhaps finally obliteration of the entire mastoid cavities by new bone. He illustrates the advantage in these cases of perforating the mastoid process, when accompanying brain symptoms prove the extension of the inflammation to the brain. Mr Hinton, in referring to this subject, says "the most scrupulous care should be given to detect any symptoms of the presence of matter pent up under the periosteum. This is generally found in one of two places—either over the mastoid process externally, or within the meatus at the posterior and upper wall. Any redness or swelling with tenderness of these parts should prompt immediate action." He points out that free incision of the posterior and upper wall of the meatus will often give great relief. In using the trephine, Mr Hinton says, "The best point to select is a spot level with the upper border of the meatus, and about half an inch beyond it; the perforator may be allowed to penetrate three-quarters of an inch." "It is," he says, "of the utmost importance not to delay too long, and since the other spray will generally suffice to deaden the pain, incision of the mastoid may be had recourse to promptly in every such doubtful case. I may repeat that I have never regretted making the incision, and scarcely ever decided against

making it without regretting that I did not." I thus prominently draw attention to this opinion, as I am aware that this is a step which is regarded with fear and a good deal of prejudice by those who are not familiar with the harmlessness of the operation, and the good results which frequently follow. On a few occasions I have in vain urged the propriety of making an experimental perforation of the mastoid process by the trephine when urgent brain complications were present, and the fear of the operation and its direct results prevented this step being taken. In both instances I can only regret that it was not performed, as death from brain trouble ensued, and the refusal of an autopsy prevented my ascertaining the cause of the fatal termination of the case. In a few instances, in adults, free incision over the mastoid, when there were signs of periostitis, has been followed by the happiest results—complete subsidence of the pain and inflammation. In children, incision down to and through the bone is the thing indicated when there are evidences of extensive periostitis or purulent formations.

To illustrate how nature demonstrates the course of action indicated in these cases, I may cite the following instances of escape of bone through the external meatus, with relief of brain symptoms.

In 1875 a child, aged four years, was brought to me with the following history. Had been quite healthy up to a few months since, when pain in the ear and discharge began. Subsequently an abscess formed over the mastoid process. The child had two or three attacks of convulsions. On examining the ear, I found the post-auricular surface soft and swollen, the meatus full of

purulent and foul-smelling discharge. I cleaned this well out, and was surprised to find the meatus filled with a piece of loose and dead bone. This I removed, incised freely the mastoid process, kept the incision plugged with iodised wool, and cleansed with carbolic lotion daily, washing out the meatus with the same. The child made a good recovery, but with loss of hearing.

In April last a young lady consulted me. The right mastoid process was completely absent, a large hollow existing. This had occurred when she was a child, and was the result of mastoid abscess, yet she had fair hearing power in the corresponding ear.

Last year a child aged eighteen months was brought to the hospital with large perforation of both mastoid processes. I freely incised the bone at either side, and almost the entire of the mastoid process came away at the time, being removed easily with the forceps. Some time afterwards she came in my absence from home, and the other mastoid process had softened, and now came away. The child became quite healthy. Here I syringed freely through the external meatus a disinfectant solution, such as chloride of zinc, Condy's or carbolic acid, the fluid running out through the aperture in the mastoid. The parts have all now completely healed, and the child was recently brought by the mother to consult me about the hearing, which is lost.

Early this year a pale, anæmic-looking child, aged twelve months, was brought to the hospital with ptosis of the right eyelid, dilated pupil of the same eye, and the vision apparently lost. There was a considerable swelling of the entire left aural region. The mastoid

was very much inflamed, soft, red, and swollen; the auricle was projecting. Altogether the child had a most peculiar appearance. There issued from the meatus a foul and long-neglected discharge. The skin behind the auricle was perforated in two or three places, and the bone was evidently dead underneath. I determined to make a free incision into the mastoid, which I did, and though, at the time, there was very formidable venous hæmorrhage, this was pretty readily controlled with a plug and compress. The ear was daily washed out with chloride of zinc injection, and the mastoid dressed with carbolised wool saturated with chloride of zinc solution. Under this treatment the child did well, but the ptosis and strabismus remained. With the ophthalmoscope there was but little evidence of any abnormalities, the only thing apparent being a hyperæmic state of the papilla. Lately this child came to the hospital when I was absent on my holiday trip, and a long piece of the mastoid came away,* the wound being treated as before.

* Represented in *Atlas*.

CHAPTER XII.

SKIN AFFECTIONS OF THE AURICLE.

Eczema.—We are constantly consulted for eczematous states of the auricle. In practice these may be divided under two heads. There is the simple eczematous eruption which is thrown out in children, especially in connection with the exanthemata and whooping cough, and which, in strumous subjects, so frequently attends various catarrhal states of the meatus and tympanum. A child with phlyctænula on the conjunctiva, or some form of catarrhal affection of the eye, comes with an eczematous state of the ear and face or head. The child is characteristic of its class; there is a general anæmic and debilitated appearance; the peevishness and irritability of temper which are usually present, parents try to soothe with sweets, cakes, and all sorts of trash; the result is, that at hospital we seldom see children of this type of constitution without the accompanying bag of sweets, cakes, or fruit. Defects in the hygienic arrangements, and all the attendant evils, help out these eczematous states. This form of eczema differs in no way from the similar disease which attacks other parts of the body. It is easily recognised by the discharge and the crust which forms. In nearly all these cases there is some constitutional cause for this local affection which should be looked to. In children

it may be disordered digestion, worms, dirt, or general impoverishment of the blood in a leucophlegmatic temperament. Softening and separating the crusts, first by packing at night and after a few days treating the exposed surface with some mild stimulating astringent, then ointment, such as benzoate of zinc with carbolic oil and vaseline, or a little of the ordinary calomel wash; and if there be much discharge, particularly if the skin between the attachment of the auricle and the mastoid be raw and moist, the use of Wilson's lotion of calamine and oxide of zinc in rose water, applied during the day, the powder being allowed temporarily to dry on the part, will be found sufficient. At the same time the internal administration of mild alteratives, with such tonics as cod-liver oil and iron, or mineral acids, is indicated. The internal administration of a few drops of liq. arsenicalis with the meals has often the best effects. But the essential element in the treatment consists in the attention paid to the diet and general surroundings of the patient. Simple and plain food, plenty of milk, and a little oatmeal in the mornings, with the avoidance of all trashy stuffs, attention to the cleanliness of the child's person, with sufficient out-door exercise, should be the directions to parents.

But by far the most troublesome variety of ulceration of the auricle is that which results from a chronic form of eczema, in which a thick and hard scab forms over a most inveterate and highly ichorous discharge. This crust clings with great tenacity to the part, and is with difficulty removed. When it is removed, the fluid which lies concealed by the scab is nearly transparent and straw-coloured. The entire helix is involved, and

the ulceration extends so deeply that there is a loss of substance, and perhaps permanent disfiguration of the lobe. I have had recently three such cases under my care.* In one there is considerable deformity, from a long-continued and oft-recurring attack of the kind above described. Various remedies had been used, but with no ultimate benefit. I was consulted when the deformity was considerable. The treatment I have pursued in these cases is much as follows:— Complete removal of the scab, and thorough cleansing of the raw surface, which is then touched with either chromic acid or carbolic acid lightly. This removal of the scab is repeated as it forms, and the acid is very gently reapplied. The patient may himself use a lotion of calomel and lime water after a few days, and smear a carbolised zinc and vaseline ointment to the part at night. A few applications of the acid are generally sufficient, and then the chloride of zinc (ʒi ad ʒi), applied after the removal of the scab, acts admirably. The main secret is the removal of the crust and the thorough, often daily, topical application to the ulcerated surface beneath. The general health, at the same time, has to be attended to, and the internal use of arsenic and iodide of potassium may with benefit be prescribed. Often in these eczematous scabs and in psoriasis of the scalp, the meatus becomes full of cakes of loose epithelium, which block up the passage, impair the hearing, and produce in time alterations in the membrane. These should be constantly and carefully removed by syringing and forceps; the passage well cleaned out with cotton wool, and chloride of zinc

* Two are represented in the *Atlas*.

with glycerine, or glycerine and rectified spirit, and nitrate of silver solution employed to keep the auricle healthy. Occasionally the fungoid growth "aspergillus glaucus" is found in the external meatus, and after prolonged attacks of catarrh and purulent discharge in the cavity of the tympanum. "The subjective appearances (Turnbull) consist in the adherence of flakes or scales of what may be mistaken for epidermis on the walls of the canal and the outer surface of the membrana tympani. After removal with the forceps the growth reproduces itself; the integument beneath is found reddened and sensitive." I have just at present such a case, in the person of a little girl from whom I removed a tympanic polypus, under my care. It is astonishing the rapidity, notwithstanding thorough cleansing, with which the fungus reappears.* The hypochloride of lime (Wreden) (2 gr. ad ℥j) is recommended, so is Fowler's solution of arsenic (Turnbull), as topical agents to prevent the regrowth of the fungus. I have used with great advantage chromic acid and alcohol and glycerine. Troublesome warts occasionally grow on the auricle; these are best dealt with by ligature, and their growth prevented by acid nitrate of mercury applied cautiously to the wart when the ligature separates. I lately removed a very large arterial wart fed directly by a large vessel, but in consequence of too early separation with the ligature, some severe hæmorrhage occurred, which was easily restrained by a compress. I had one case of epithelioma of the auricle in the person of an otherwise healthy farmer. As I proposed removal of

* This patient has been cured by daily syringings, cleansing of the canal, and the use of glycerine and alcohol.

the part affected he left me, and I am aware that, up to the time of his death, which occurred from another cause shortly after, this disease increased and involved the entire helix. But epithelioma is very rare, and the only prudent treatment is the knife, and that early. An example of schirrus I have never seen.

CHAPTER XIII.

OTHÆMATOMA, OR SANGUINEOUS TUMOUR OF THE AURICLE.

OTHÆMATOMA, or sanguineous tumour of the external ear, is, with very rare exceptions, solely met with amongst those affected with cerebro-mental disease, and has hence been termed "the insane ear."

Nature and Appearance.—Othæmatoma consists of an effusion of blood from the perichondrium investing the cartilage of the auricle, appearing as a tense and shining tumour of a reddish blue or livid colour, varying in size, and occupying some portion of the concavity of the organ, rarely forming on the posterior convex surface. One such case has, however, come under my observation; here, however, the tumour was not confined to this region. When it commences in the concha, the tumour is generally localised above, and externally by the ridge of the antihelix, and extends inwards towards the meatus externus, which it may occlude, causing deafness according to the degree of occlusion. In this situation the tumour presents itself as a smooth, and usually even swelling, about as large as a pigeon's egg; when the fossa of the helix is the site of the effusion, it is confined below by the ridge of the antihelix, and the swelling then assumes a somewhat kidney-shaped outline. In exceptional cases the tumour becomes extended over the entire surface of the auricle,

and when this is the case, the various ridges and cavities become wholly obliterated, the hollow of the ear being filled by an egg-shaped swelling, fuller above, and losing itself inferiorly in the lobule, which is never implicated. Two such cases are at present under my observation. In one, a female suffering from active melancholia, a hæmatoma appeared in the left ear, May 30, 1877, and in *three* days it had developed to a large globular tumour, filling the entire cavity, of a livid red colour, and completely obliterating the meatus. In two months it had commenced to shrink, and now (November 1877) the ear is quite shapeless and shrivelled. The second instance occurred in a male patient suffering from subacute mania, the entire cavity of the auricle becoming occupied by a large ovoid sanguineous swelling, without any known cause, in less than twenty-four hours. The ear in this case is now also shrunken, the upper part of the concha being thrown into several sinuous folds, the organ still, however, retaining its normal shape and gross outline. Othæmatomata are accompanied by scarcely any subjective symptoms, but little pain or increased heat being experienced, and any deafness that may exist being due to the mechanical closure of the external meatus by the tumour. They frequently form very rapidly, instances of which I have just mentioned, but usually from a fortnight to three weeks elapse before they become fully developed. The contents are usually found to be purely sanguineous, though a yellowish serous fluid has been observed to escape on puncture; the contained blood remains fluid for a longer period than when extravasated elsewhere, but when evacuated shows a tendency towards

normal coagulability. Suppuration sometimes occurs in the contents of the tumour, accompanied then with the usual symptoms of heat, pain, &c., followed perhaps by rupture of the sac, if the latter be not surgically interfered with. In one such case lately under observation free incision afforded vent to a large quantity of sero-purulent fluid, but the tumour rapidly filled again, death taking place before further interference could be had recourse to, the case being one of far advanced paralytic dementia.

The course of othæmatomata in many respects closely resembles that of blood extravasations occurring in other parts of the body. The tumour, in its ordinary condition, rarely bursts, though the skin may crack, and some sanguineous oozing follow, usually at about the end of three weeks, or from that to a month, when the tumour has become fully developed, the effused blood slowly coagulates, and gradually solidifies, and then what may be termed the secondary stage, or that of *shrivelling*, commences. As the watery portion of the blood is re-absorbed, and the fibre precipitated, the skin and cartilage become irregularly adherent to the cyst walls, and the latter contract unequally upon themselves; new fibrous tissue is then formed, which in time may become cartilaginous, or even osseous; and as the result of these changes; the affected surface of the auricle is distorted, and assumes the most bizarre and fantastic forms, which are henceforth permanent. The hollow of the ear may be thrown into irregular folds or sinuosities; the helix folded over the concha, which may be greatly thickened, and frequently the entire organ becomes so crumpled and shapeless as to be barely recognisable. I have in my

possession the ears from the body of a man who had had blood tumours very many years previously, and here the different portions of the organs have become so incorporated with each other, that their normal configuration is almost entirely obliterated. Regarding the frequency with which either ear is affected, observers state that in three cases out of four the left is either solely, or, in cases where the effusion is bilateral, primarily attacked. In the majority of cases I have met with, the affection has been bilateral, but in those unilaterally attacked the left side has the preponderance.

Pathology and Ætiology.—The morbid appearances presented by the shrivelled ear differ according to the age of the formation. Dr Balow, as mentioned by Dr Alexander Robertson ("Glasgow Medical Journal," July 1875), states that at the end of two months he has found a section to be dark and fleshy in aspect, firm and slightly elastic in structure, and adhering closely to the cartilage of the auricle, and less firmly, though with considerable tenacity, to the perichondrium. The tumour was one-fourth of an inch in its thickest part; a transverse section, under a power of 300 diameters, showed it to be composed almost entirely of white fibrous tissue, with here and there collections of shrivelled blood corpuscles—the fibres being stained at these points with blood pigment. The fibrous tissue was denser at the point of junction of the cartilage with the tumour than at any other point. One of the shrivelled ears I last mentioned, which I have examined, measured on section 1⅛ in. in greatest thickness, and was dense and solid throughout. A fine section under the microscope showed it to consist of somewhat loose fibrous tissue with de-

posits of fine hyalin cartilage, and a little within the centre a triangular-shaped mass of bone containing wide channels with lacunæ and canaliculi. The condition of the ears here, as I have mentioned, was of very long standing, and between this and the organised clot of the earlier stages I noticed fibrous tissue and cartilage in varying degrees of development.

The ætiology of othæmatoma is still obscure, and much difference of opinion as to its causation exists amongst those who have written on the subject. Dr Wilks considers the tumours to be the result of violence, inflicted either by the patient himself or by others, the constitution being predisposed to sanguineous effusions. This view is, however, negatived by the experience derived from the modern treatment of the insane, which is now free from any such violence, and yet the occurrence of hæmatoma is no less frequent now than in former times, before the humane system was introduced. Moreover, if injury were the cause, we should expect to find ecchymosis or abrasion of the skin, with damage to the auditory apparatus, which, so far as I am aware, never appears; and again, on the opposite hand, as Dr Lennox Browne remarks, how many blows are being inflicted on the ears amongst those not insane, and yet hæmatoma is not developed as the result. Dr Nicol has suggested that the sanguineous effusion is produced by the pressure of the delicate structure of the external ear against the mastoid process of the temporal bone during sleep, by the pillow beneath—especially when the latter is hard—in a patient weakened by some "blood dyscrasia." Were this the cause, many more cases of othæmatoma must occur, as the

great majority of patients who are likely to be its subjects lie on one or the other side, bear the same pressure, and suffer from the same blood dyscrasia, and yet hæmatoma occurs in but a small minority. Moreover, as Dr Lennox Browne goes on to say ("West Riding Asylum Reports," vol. v.), "there is no reason to suppose that the pinna is delicate and peculiar in structure, but on the contrary, its tissue is that best adapted, by elasticity and firmness, not only to resist violence, but also mould itself to receive pressure." Dr Robertson thinks that othæmatoma is most probably due to functional disorder of the cervical sympathetic, associated with, or perhaps resulting from, the existing cerebral or cerebro-spinal disturbance. He grounds this opinion on the following data:—(1.) The tumour not unfrequently appears on both ears simultaneously, without any indication of either being injured. (2.) An effusion under the conjunctiva occurred in a case of dementia at the same time, and on the same side as the tumour of the ear. (3.) Some of its complication, such as Graves' disease, indicate disorder of the vaso-motor system. Whether such vaso-motor disturbance is the cause or not, there can be no doubt that mental excitement, resulting from derangement of the vascular system, is a very constant factor, its occurrence being most frequent in those forms of insanity (*vide* appended tables) in which such excitement runs high.

Forms of Mental Disorder in which Othæmatoma occurs.—Othæmatoma is not confined to any one form of insanity; it has been found in mania, melancholia, and dementia, but it occurs most frequently in general paresis, and insanity associated with epilepsy. The two

following tables give the form of mental derangement, and the relative frequency with which one or both ears were affected in fifteen cases which have come under my observation:—

TABLE I.—*Males.*

Name.	One or both Ears.	Form of Mental Derangement.	Result.
H. D.	Both.	Acute Mania.	Died.
D. R.	Right.	Subacute Mania.	Recovered and discharged.
C. H.	Both.	Relapsing Mania.	„ „
J. M.	Both.	Chronic Dementia.	Died at an advanced age.
P. L.	Right.	Acute Mania.	Recovered and discharged.
E. M.	Both.	Imbecile.	In Asylum still.
J. H.	Both.	Acute Mania.	Died.
J. R.	Left.	Subacute Mania.	Recovered and discharged.
J. M.	Left.	Acute Mania.	In Asylum still.
D. S.	Both.	Subacute Mania.	„ „

TABLE II.—*Females.*

Name.	One or both Ears.	Form of Mental Derangement.	Result.
H. M'C.	Both.	Acute Melancholia.	Recovered and discharged.
E. D.	Both.	Epileptic Dementia.	In Asylum still.
B. C.	Left.	Epileptic Idiocy.	Died.
M. H.	Left.	Dementia.	In Asylum still.
E. H.	Left.	Active Melancholia.	„ „

Of these fifteen cases, eight males were the subjects of either acute, subacute, or relapsing mania, with greater or less excitement. Of these four have recovered from their mental derangement, two died from maniacal

exhaustion, while the remaining two are still under treatment in the asylum. One of these has considerably improved, and there is a prospect of his ultimate recovery; in the other the tumours aborted before arriving at perfect development. Of the remaining seven, three suffered from chronic weak-mindedness, two males and one female; two females from mental disorder complicated with epilepsy; and two females from the more acute forms of melancholia with considerable excitement. Of the fifteen cases, in eight, six males and two females, both ears were affected; while out of the remaining seven, the left was alone affected in five, three females and two males, the right, in two males, showing a preponderance of the former over the latter. As regards the influence of othæmatoma in the prognosis of mental derangement, it has hitherto been almost universally stated that it is unfavourable in the highest degree. Dr Savage, of the Bethlem Royal Hospital, says, that in that institution he has never seen a case in which it occurred recover. I am inclined to think, however, that its importance in this respect has been too highly estimated. Referring again to the cases above tabulated, it will be seen that five out of the fifteen have been discharged recovered, and there is a prospect of the recovery of a sixth; hence, though an unfavourable prognostic, the development of a hæmatoma should not, I think, be looked upon as one of the physical characteristics of a hopeless lunatic.

Treatment.—Gruber, in an article on othæmatoma in his handbook of ear diseases, suggests surgical treatment, and recommends evacuation of the contents of the tumour and subsequent compression; the difficulty, however, of dealing with the class of patients in which

such tumours occur, must in the great majority of cases prevent any such interference; it is to be feared also that such pressure as could be applied to the ear would be powerless to prevent the refilling of the tumour, the contents of which might then, from the admission of air, undergo suppuration, and greater mischief follow than if the tumour had not originally been interfered with. In seen few cases indeed, where, on other grounds, a hope of final recovery from the mental disorder exists, and when it may be important to prevent the possibility of the after deformity which will in all probability result if the swelling be allowed to run its course undisturbed, the aspiration of the sanguineous effusion may perhaps be attempted, and an endeavour be then made to induce rapid and equal adhesion between the cyst walls. Painting the surface of the tumour with vesicating fluid has been also suggested, and I believe tried successfully in several cases, though as far as I am aware it has not come into extended use.

The following conclusions Dr Lennox Browne, in the paper already mentioned, considèrs to have been fairly established as the result of much independent investigation.

1. That prior to the occurrence of an othæmatoma the tissues of the auricle undergo a softening process (Virchow) or chondromatic change (L. Meyer). These changes are synonymous with the "vegetative disturbance" (blood dyscrasia) of Fischu and Nicol. No evidence has been adduced of the pre-existence of atheromatous disease of the vessels, as is believed by Gruber and others.

2. That the general nutritive derangement to which all othæmatomatous patients are subject, and the con-

spicuous absence of these tumours in the persons of patients suffering from monomania, a mental disease which only involves a portion of the cerebral machinery —or in which, as in melancholia, the lesion is of the most airily material nature (Nicol), induce a belief that the aural tumour is in a large measure the result of a general, and not of a purely local condition.

3. That intense general excitement is an important and almost universal factor in the causation of these tumours, leading as it does to considerable vaso-motor disturbance, and that the intimate connection of the cervical and intracranial ganglia with the vessels of the auricle strongly predisposes to vascular extravasation in their neighbourhood.

4. That the vascular distribution of the part receiving as it does branches from the terminal arteries of the external carotid, all freely communicating with each other, and anastomosing with vessels supplying the brain structure itself, is sufficient to account for the preference of the auricle as the point of effusion. The helix being the thinnest portion, is that part which is first attacked.

Lastly, That the left ear is most frequently affected, or when the hæmatoma is bilateral, is the first in which a tumour is developed; my own explanation (Dr L. Browne's) of this fact is the nearer position of the left common carotid to the heart, and the more direct, and less impeded arterial supply to the left, than to the right side of the head. It may just be noted that arachnoid cysts, so frequent in that form of mental disease in which othæmatomata may be expected are more commonly found on the left than on the right hemisphere of the brain.

CHAPTER XIV.

DEAF-MUTISM.

ANY physician who has had a child brought to him for his opinion as to the probabilities for or against the little one's hearing or speaking, and who has seen the look of agony and despair on a mother's face as she hears her worst fears confirmed, must feel the great importance of the subject of the education of deaf children. In a professional point of view, it is of vital importance that all who are consulted in such cases where the hearing is either in great part or entirely lost, and the power of speech absent, should be in a position to advise parents as to the best course to pursue in the training of the child; but it is also of vast moment, from a social aspect, that deaf-mutes should be so taught as that they may become fairly useful members of society, and be fitted to fill certain positions and earn a livelihood. The few remarks that I make on this subject are intended merely to draw the attention of practitioners generally to the means which can be adopted to, in some measure remove the deplorable consequences of this melancholy affliction. Before doing so, I would refer those who are interested in the subject to a paper published by Mr Dalby, and read by him at the Social Science Congress in 1871 (J. & A. Churchill, London), also to the chapter on deaf-mutism in the work by Dr L. Turnbull.

The two systems by means of which mutes can be educated are by the "lip method and dactyology." As the later or "finger" method is generally well understood, I merely desire here to draw attention to that plan generally adopted on the Continent, and of late carried out in England, viz., teaching by lip movement. The explanation of the manner in which the mute is gradually taught by the movement of the lips and cheeks in phonation, and the assistance of various objects of interest to a child, will be found explained in the above-mentioned paper of Mr Dalby, and in the chapter on the same subject in his work on Diseases of the Ear. In pointing out the advantages of the lips over the finger system, Mr Dalby says, that when the children have acquired the power of talking by the dumb alphabet, however perfectly, and go out into the world, they are still deprived of all intercourse with their fellow-creatures, excepting in those very rare instances where they happen to meet with those who are able to converse in the same way as themselves, the proportion of such persons in ordinary life is so small that for the sake of argument they might almost be put out of the question; or again, on the supposition that a mute could only acquire the power of *reading* from the lips of others, without being able himself to articulate and thus convey his ideas to others, it becomes a question whether he would not, although he had to reply to everything by writing, be a more useful member of a community composed of ordinary speaking individuals, than a mute who could only receive and convey his ideas to those similarly situated as himself, or be dependent for conversation on a chance meeting with some one who had acquired his peculiar

language. If such a proposition bears a moment's reflection, it must be apparent how very considerable must be the advantage of that mute who possesses not only the power of receiving information conveyed in the language familiar to all, but also of replying in the same manner. Both of these faculties however are, in the system under consideration, so intimately combined, that one naturally follows from the other." A very little time since I had a patient brought to me to the hospital who had acquired this habit of speaking. I tested her by several sentences, and carrying on conversation with the friends who brought her, and no matter how quickly I spoke, she understood everything I said; she had lost her hearing when a child from scarlatina, and had subsequently lost her power of speech. Dr Turnbull, in a paper read in 1876 before the International Medical Congress, makes some useful remarks on this subject, which I take the liberty of quoting:—

"The lot of the uneducated and ignorant deaf mute is sad indeed; cut off from intercourse with his fellow-man by loss of speech, and unable to obtain instruction or amusement from such intercourse, or through books, he is left to 'nature,' and is governed by naught but his animal passions and appetites. It is no wonder, then, that when these latter are in full development, he becomes allied to certain of the brute creation. From my own dissection of the brain of the deaf mute, as from those of many careful observers, it is rendered probable that the deaf and dumb are capable of receiving and retaining as great an amount of intellectual knowledge as their hearing brothers or sisters, provided that adequate instruction be made available through the eye.

"Another advance which has been made in the further improvement of the mode of instruction of the deaf-mute, comes from England, in the system known as 'Bell's Method of Visible Speech,' which, having received but little attention in the country of its origin, was brought by its author to the United States, where it has been received and adopted in seven of our forty-eight institutions, and with the most gratifying results. I do not find fault with what has been done under the old methods, but rather rejoice that so many thousands of deaf-mutes have received the advantages of an education by means of the sign language, and of articulation taught by the German method. I would also state that the United States have a 'National College' at Washington, where more advanced studies can be pursued, and where young deaf-mutes are graduated with a standing and scholarship not inferior to that achieved by the graduates of ordinary colleges. This institution bears to others for the deaf and dumb, the same relation that colleges bear to schools and academies. Many of the graduates of this college have received appointments as teachers, while others are editors, authors, and writers, or are found in the various government offices, in the exercise of duties which they are quite capable of performing in an entirely satisfactory manner. In our Centennial Exhibition will be found some admirable pictures executed by deaf-mutes, as well as other products of their pencils and pens. They are also capable handicraftsmen, and are to be found in our shops and factories, as well as in the Industrial Homes founded in this city for their special benefit.

"Bell's method or system of visible speech gives the

pupil, by means of drawings, &c., a knowledge of the concealed parts of the mouth and throat, which are used in articulation, as also of the movements of the various parts, so that the pupil is thus better able to gain conscious control over them. This method of writing any sounds that the pupils may utter, serves to interest them in the practice of the elements and combinations, thus giving them great power over their organs of speech, and obviating the necessity of informing them that a sound is wrong if it is not the one which the teacher wishes to obtain. It is the practice of those who teach this system to write all sounds in the visible speech-symbols, and especially those that are essential in English speech. The symbolising of odd sounds also leads the pupil to think and study about the parts of the mouth that produce them.

"I shall now discuss the following questions: (1) What is the best method of classifying deaf children, and is it advisable to place them in ordinary, or in special, schools? and (2) How many deaf-mutes are capable of receiving Bell's method of instruction, and should the attempt be made to instruct all deaf-mutes by articulation, or by the sign language only? Not having heard Dr Blake's paper, I shall attempt to answer these questions from my own personal observations.

"If a child can hear sufficiently well to understand the teacher when near him, the ordinary school is, for him, decidedly better than a special school. Children sometimes become deaf after having learned to talk and read; such children may profitably attend an ordinary school, provided that the parents or teacher take time to explain the lessons; but if this be not done, the

child will often recite in a parrot-like manner, without understanding what he has learned, and will go over a great deal of ground with very little profit. This has been the experience of teachers of deaf-mutes, even when the pupil has learned to read quite well by observing the lips of the speaker. Congenital deaf-mutes, attending an ordinary school, may learn to write, or rather to copy, and may perhaps get some idea of numbers; but the teachers of such schools do not know how to teach their pupils' minds, even if they have the time to teach them. As a rule, such children might as well be at play, except that school occupies their time and their thoughts. Another advantage, however, which is gained for the deaf-mute children, is in their mingling as much as possible with those who hear.

"If a child cannot profit by the instruction given in an ordinary school, let him if possible have a private teacher, but not necessarily in his own house, as he is not always subject to the best government there. If he needs stimulating, it may be well to place him in a class with four or five others of a suitable degree of advancement; and if this cannot be done, he may be placed in a school or institution where the instruction is especially adapted to the deaf.

"If children are too deaf to profit by the common school, and yet have sufficient hearing to have acquired speech through the ear, instructors of the deaf are nearly or quite unanimous in the opinion that they should be taught by articulation and lip-reading. The experience of the teachers would lead them to say, 'Let the attempt be made, if possible, to teach *every* deaf child in this way.' Of 116 pupils in the 'Clark Institution for

Deaf-Mutes,' three have been dismissed as incapable of learning articulation and lip-reading, and one because she required more individual instruction than could be given her. The latter, however, has since been taught, so that speech and lip-reading are her means of communication in her own home. Some of the remaining number of pupils (congenital mutes) speak imperfectly, but in every instance well enough to be understood in their own homes, while some of the indifferent speakers are fairly successful in lip-reading, an acquisition as valuable as that of speaking. Many congenital mutes speak so as to be understood by strangers, and will probably be able to make speech and lip-reading a successful means of communication throughout the world. Of the 116 pupils at the above-named institution, one-third are semi-mutes or semi-deaf, although some of those so classed have not had hearing enough to learn to talk.

"My object," says Dr Turnbull, "in writing this brief paper has been: (1) To excite a greater degree of interest, in physicians, for the deaf-mute, with an endeavour on their part to prevent deafness, and so diminish the number of deaf-mutes; (2) To induce a more conscientious study and treatment, by physicians, of the ears of their patients, when the latter are attacked by scarlet or typhoid fever, cerebro-spinal meningitis, or obstruction of the Eustachian tubes as the result of measles, diphtheria, tonsillitis, or syphilis; (3) To lead physicians to give the systems of instruction pursued in our various institutions for the deaf and dumb, a certain amount of study, so as to be able to recommend intelligently to patients, their relatives, or friends, the best method for each individual case; and (4) To induce physicians to recom-

mend that there should be appointed by the governor of each State, a commissioner, to collect, examine, and classify the deaf and dumb, so that all who are found to possess any degree of hearing, or any remnant of speech, may be taught articulation by the method of Bell, and that those who are unable to profit by this system, may be taught the language of signs, natural or acquired.

"To aid them in their arduous work, I have recommended to some of our teachers of deaf-mutes that their pupils should use mechanical applications for improving the hearing power. By speaking or singing different vowels into one of these aids to hearing (tubes or trumpets), we can determine how much hearing the pupil possesses, and, if he be able to distinguish one vowel from another, a continued use of this mechanical aid may ultimately enable him to utilise audition as an auxiliary to vision. I have known very deaf persons, by the aid of this means alone, to have their hearing so much improved that they could distinguish all ordinary sounds, and by some effort enter into conversation. Another important mechanical aid to persons who are deaf from diseases in which the tympanic membrane is lost, in part or in whole, but in which the inner small bone, the stapes, still remains, or in whose ears the bones have become stiff or ankylosed, is the pellet of cotton moistened and applied near to the bones or against the stapes, so as to bring the parts in closer contact with the external vibrations, and thus cause the sounds to be transmitted to the auditory nerve."

I have examined all cases of deaf-mutism I have ever seen with the laryngoscope, and in no case have I detected any laryngeal anomaly. With the exception

of cases in which the membrane was destroyed by scarlatina, or by ulceration accompanying mastoid disease, I have noticed no peculiar condition of the membrane. As it happens that a large proportion of mutes do hear sounds, the voice, certain notes, &c., it is evident that an endeavour should be made at all times in children to increase this power.

In all instances, then, when the intelligence of the child warrants such, the parents and friends should be cautioned to persevere in coaxing the child to articulate and copy sounds. The hereditary and congenital aspect of mutism are not to be forgotten, and the intermarrying of near relatives of deaf or mute persons should be discountenanced. But decidedly in all cases where such a step can be taken, the child should be early removed to an institution where the teachers are accustomed to take real trouble, and to give the mute the benefit of a skilled training. It should never be forgotten that at an early age after destruction of the membrane from scarlatina, or other cause, the hearing being lost, the speech is also impaired, and it is then that we must endeavour to educate the child, and to maintain the power of articulation while the child is under treatment, and even after this.*

* Full particulars regarding the regulations of the school under the auspices of the Association for the Oral Instruction of the Deaf and Dumb, may be had, with the rules for admission, and the form of application, from the Honorary Secretary, Assur Moses, Esq., 4 Fitzroy Square, London; or a report of the Conference of Teachers of the Deaf and Dumb in England, held in 1877 in London, may be obtained from the Rev. S. Smith, 272 Oxford Street.

CHAPTER XV.

BATHING AS A CAUSE OF DEAFNESS.

I CANNOT pass over this important and frequent cause of impairment of hearing, the result of inflammation of the membrane, tympanic inflammation, or the passage of water into the tympanic cavity, without drawing attention to it, though very briefly. Constantly I have been consulted for deafness produced by sea bathing. In the cases I have seen, the general conditions have been thickening of the membrane, fluid in the tympanic cavity, and closure of the Eustachian tube. In some there has been either a recent or remote history of inflammation in the auditory meatus, with pain; but frequently all that the patient complains of is tinnitus aurium, accompanied with deafness, which, though at first slight, goes on steadily to a most unpleasant and troublesome pitch.

"The symptoms," Turnbull* says, "of water in the middle ear are, in the first stage, an uncomfortable sensation, followed by ear-ache or pain, which after a time becomes agonising, and is accompanied with great tenderness behind the auricle." In such cases the mischief may before long extend to the brain, and the most alarming symptoms, delirium and coma, result. Inflammation in the cavity of the tympanum, extending

* Paper, International Congress, 1876.

to the naso-pharyngeal tract, is followed (Turnbull) by a purulent effusion, which immediately indicates incision of the membrana tympani to give exit to the pus. If there be a discharge, chronic in character, from the meatus, Turnbull advises a powder of "salycilic acid and starch, blown into the meatus, and after a time washed out, reapplied twice daily until the discharge has ceased, and the perforation has healed." I have not seen these acute cases; but I have frequently observed instances of permanent and incurable deafness, with troublesome tinnitus, when the origin of the affection was clearly traced to bathing. In the more recent and milder cases, I have had the best results from alkaline injection into the tympanum with the Eustachian catheter, and air douche. Frequently we are asked our advice as to the prudence of bathing by aural patients. It is well to remember these dangers, especially when perforation of the membrane is present, or inflammatory and altered states of the tympanic membrane or cavities. I never advise an aural patient to plunge into cold water. Turnbull advises the head to be placed to one side, holding the ear well out and opening the mouth, when water is found to enter the ear.

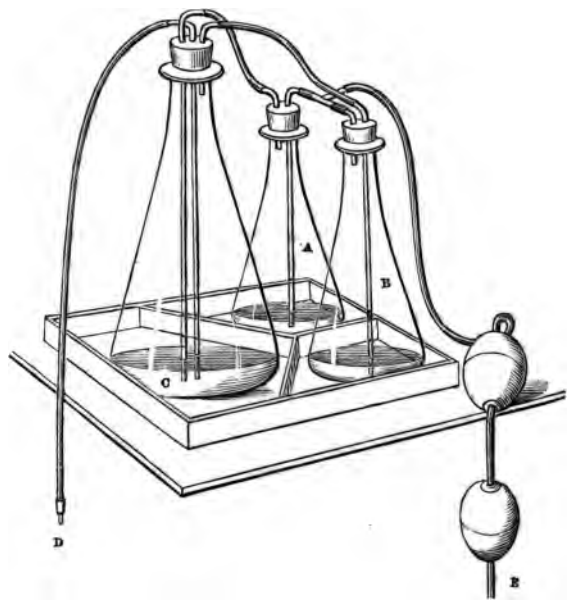
ABBREVIATED TABLE OF DISEASES.

The subjoined brief Table of Diseases I have arranged from our *Hospital* Register of the last 1500 cases treated, as they have been classified by my assistants.

Eczema, auricle and meatus,	46
Inflammation of the meatus, leading to abscess,	88
Catarrhal inflammation of meatus,	179
Cerumen, epidermis, &c. (in auditory canal),	295
Foreign bodies,	18
Injuries of the auricle,	4
Tumours of the auricle (sebaceous, nævus, warts),	5
Congenital absence of meatus,	1
Congenital abnormalities of auricle,	4
Exostosis,	5
Polypus in external meatus, on the membrana tympani, or in the tympanum,	61
Ulceration and perforation of the membrane,	218
Acute inflammation of the membrane,	81
Chronic changes in the membrana tympani, with alterations in its position, consistence, and appearance (with or without ankylosis),	138
Mucus in the tympanum,	64
Eustachian tube—collapse, closure, or obstruction of, with secondary tympanic mischief,	159
Internal Ear, with nervine lesion,	71
Mastoid periostitis, leading to abscess and caries,	7
Unclassed affections of the membrana tympani, the tympanic cavity and Eustachian tube,	105
	1500

MEDICATED VAPOURS.

Not employing medicated vapours much myself in the treatment of affections of the tympanic cavity, I have not in the foregoing pages dwelt on their efficacy, nor have I spoken of the various forms of apparatus used in their application. The two I think most useful are iodine vapour and that of chloride of ammonium. I think the immediate generation of this latter vapour by means of the ordinary triple bottle apparatus, from liquor ammonia with hydrochloric acid, is perhaps the best plan, and the simplest to adopt. It can be had of Messrs Khrone & Sesemann. My friend Mr Swanzy, of the National Eye and Ear Hospital, Dublin, after considerable experience of this vapour, used in this manner by means of the catheter, speaks well of its action. The vapour is passed direct from the receiver into the tympanum by means of a tube attached to the Eustachian catheter.



A, Bottle containing hydrochloric acid; B, Bottle containing liquor ammonia (B.P.); C, Large bottle containing water; D, India-rubber tubing with tip for catheter; E, Handbag to expel vapours into large bottle where combination takes place.

VENTILATING THE TYMPANIC CAVITY—GRUBER.

Dr J. Gruber has suggested an improved method in the use of Politzer's bag since Lucae ascertained the action of the tubal muscles in phonation. In a paper contributed to the "Lancet" (January 12, 1878), he says:—

"In order to obtain an effective separation between the upper and lower parts of the pharynx, the muscles of the soft palate must be brought into play at the same moment that the Eustachian tube is opened. All this is obtained by the simple pressure of the root of the tongue upon the hinder part of the palate, if a strong expiration is made at the same moment. If one presses the posterior part of the tongue against the palate, the cavity of the mouth is shut off from the throat, and the soft palate is pressed upwards and backwards. The air, which passes in expiration into the throat, has no escape either through the mouth or through the nose, of which fact one can easily convince one's self by holding the hand, or a small flame, in front of the nose. The latter is not moved, and the hand is not conscious of the least breeze during the expiration, as would be the case did the air escape from the nose. The stronger the expiration at this moment, the more tense will be the soft palate by the pressure of the escaping air, and the more effective the closure of the upper pharynx. This moment, as regards the arrangement of the pharyngeal parts, is the most favourable for giving the maximum degree of pressure to the pent-up air, by emptying the Politzer ball into the nose by the nozzle introduced as usual.

"Had we always quite docile patients before us, we should certainly make use of this method; as this is not the case, we must be content with such movements as come nearest to that above described. The result of the investigations which I have made in my own mouth, and in those of patients, is that we obtain the result when the consonants 'h,' 'k,' 'k,' are sounded together in the most sudden manner. In such a mode of operation, much depends upon the patient's powers of comprehension, and it is often easier for the surgeon to direct the patient to repeat some complete syllable, as it will demand less explanation to make them use a vowel between the consonants, as 'hack,' 'heck,' 'hick,' 'hock,' 'huck.' Let any one utter the indicated syllables in succession as they are written down, and he will find that the tongue is pushed further backwards, and more firmly upwards, the further we proceed in the succession of syllables,

so that with the syllable 'hack' the tongue is placed most forward, and with the syllable 'huck' is pushed back to the furthest degree, and against the parts above; and in this way the upper pharynx is narrowed, and effectually closed. The backward and upwand pressure is stronger, and the closure more effectual when the combination of consonants 'hck' is uttered without the vowel.

"The treatment which I now, supported by the facts given above, recommended for cases alluded to in the preliminary remarks is as follows :—The operator stands or sits, as is most convenient for him, in front of the patient, and the end of the noozle of the syringe (the ball of which is held in one of the operator's hands) is passed to the depth of one-third of an inch into the nasal opening. The operator then, with the thumb and first finger of the other hand, closes the opening around the syringe nozzle most carefully, and while the patient utters one of the prescribed syllables ('hack,' 'heck,' 'hick,' 'hock,' 'huck,' 'hck,') the ball is compressed, and the air flows with a clearly perceptible noise through the tubes into the tympanic cavity."

"If I allow the patient to incline his head strongly towards one shoulder during this treatment, it is always successful, especially if I pass the nozzle into the nostril which corresponds to the ear into which I wish to inject the air. In those cases in which the air came into the ear of the other side as well, it almost always happened that the patient could feel the passage of air more strongly in the upturned ear. If the patient, treated in this way, once perceived certainly that the air entered the ear, he had the same perception if I repeated it several times one after the other, or on different days.

"To sum up the advantages of my method over that of Politzer:—

"1. It is more simple. The swallowing movement being abolished, the sipping of water is no longer necessary. One needs to learn the objection patients feel to this water drinking in order to estimate the boon it would be no longer to need it. Although I have used this method of treatment much less frequently than others, still there always stood on my table a great number of glasses ready, and it often cost a patient a great effort of will to take a sip out of my glasses. How can you blame him, when you remember that one's consulting-room is at all times receiving patients suffering from contagious diseases?

"It is easily understood that when the treatment is needed frequently the swallowing of so much water is not only troublesome but hurtful. If it is replied that the patient could make the swallowing movement without water, I would reply that then the introduction of air through

the tube often fails; and, on the other hand, that the frequent empty swallowings are more painful than when water is used. I will not mention cases in which diseases of the neck render deglutition difficult further than to say that, while attempting to swallow, air passes into the stomach, and causes severe pain, until several eructations have relieved the organ of the injected air.

"2. Is one able to keep the pharyngeal parts in the position assumed in uttering the prescribed syllable, especially the 'k,' then the air can for a longer time be made to enter the tubes than could be the case with the brief act of swallowing, which cannot possibly be prolonged, and I hope it will some day be possible to direct medicaments into the tube in this manner.

"3. By using the above list of syllables carefully the air may be made to enter the tubes with varying degrees of force, which advantage will appear more clear when it is mentioned that the suddenness of the action in the Politzer method has often led to tympanic rupture.

"4. My method is especially adapted for self-treatment, because the patient learns by his own sensations to increase the force with which the current is sent into the ears.

"Permit me now to leave my method in the hands of my honoured fellow-physicians, and to hope that they will soon communicate the results of their experience with it."

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